Book of Abstracts

Lourdes E. Echegoyen, Editor

4th ANNUAL

SPRING 2014

**Showcasing Emerging Researchers,
Scholars and Artists**

April 25 & 26, 2014

Table of Contents

Editor's Note

As UTEP celebrates its centennial in 2014, it is looking back to all the traditions it has established in order to become the institution it is today: an emerging research university at the forefront of higher education transformation in Texas and the US. It is also looking through futuristic lenses into the next 100 years to determine what new initiatives it must establish to achieve the transformation that will positively impact the education of our next generation of students. One past tradition that has been recognized nationally as a high impact educational practice is student engagement in undergraduate research. In the days when there were less than a handful of PhD granting departments at UTEP, faculty recruited undergraduate students to help them carry out their research projects. Little by little faculty recognized the dual value of these interactions: projects were progressing rapidly and competitively, bearing fruit in the form of publications and grants; learning, retention, and time to degree notably improved for student participants. Other institutions that were incorporating undergraduates in research had the same results. These observations led federal agencies like the National Science Foundation and the National Institutes of Health to develop funding programs for training undergraduates in research. Today, undergraduate research in every discipline has acquired tremendous momentum in higher education, regardless of whether the institution primarily serves undergraduates or is a top research university. UTEP has been no stranger to federally funded research training programs for undergraduates and several of its pioneer faculty have decades of sustained funding for programs like MARC, RISE, REUs, and LSAMP, most of which are geared for STEM disciplines. Recognizing all of these facts, UTEP's president, Dr Diana Natalicio had the vision of establishing the Campus Office of Undergraduate Research Initiatives (COURI) to expand the tradition beyond STEM, leverage resources, bring greater visibility to the practice and make undergraduate research a campus-wide activity. When COURI opened its doors in the College of Science in September of 2010, the vision was to have COURI start by learning the lessons from the science programs, bringing initiatives to broaden them and showcase their excellence, and expanding gradually to every college to offer campus wide training opportunities to students and their faculty mentors. The targeted date for this expansion was the university's centennial. We are proud to announce that with this symposium COURI is officially serving the entire campus. We at COURI know that undergraduate research is not just a high impact educational practice; it is the practice with the highest impact because it encompasses all other best practices, including learning communities, collaborative assignments, intensive writing, service learning, global learning, first year seminars, internships and capstone courses. The projects presented at this symposium are a testament to this. We strongly believe that undergraduate research will transform higher education, which is not simply an extension of secondary education, but the place where original and creative contributions to each discipline are produced, where new knowledge is made. We hope that this symposium will allow all of us to appreciate the state of the art research, scholarly and creative activities that our undergraduates are involved in. We also hope that the presentations from the three eminent guest speakers will challenge us to think big, realize the importance of connecting with others within and outside our disciplines, and to raise the bar for the next century.

Lourdes E. Echegoyen
Director of COURI

UTEP COURI
CAMPUS OFFICE OF UNDERGRADUATE RESEARCH INITIATIVES

Mission

Through collaborations with faculty mentors from all disciplines,
COURI's seeks to enrich the experience of UTEP students
by facilitating their training in research, scholarly and creative activities,
enhancing their academic success and professional development,
and showcasing the results of their work.

4th ANNUAL

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PROGRAM AGENDA

Friday, April 25, 2014

4:00 - 5:00 PM	Rob La Frenais, PhD Curator, Art Catalyst *"Dreaming the Theory: How Artists & Scientists Collaborate"*	Auditorium Rubin Center for the Visual Arts
5:00 - 6:00 PM	Student Art Exhibits & Reception	Rubin Center for the Visual Arts

Saturday, April 26, 2014

10:00 - 10:10 AM	*Opening Remarks*	Room 126 Undergraduate Learning Center
10:10 - 11:00 AM	Luis Echegoyen, PhD Robert A. Welch Chair Professor *"Science & Serendipity: From the Discovery of New Carbon Materials to the Nano Revolution"*	Room 126 Undergraduate Learning Center
11:05 AM - 12:20 PM	Student Poster Presentations - Session A	Lobby Undergraduate Learning Center
12:30 - 1:45 PM	Student Poster Presentations - Session B	Lobby Undergraduate Learning Center
2:00 - 3:00 PM	Herb Childress, PhD Director of Metaphor, Teleidoscope Group, LLC *"Wicked Problems: Why All of You Are Architecture Majors"*	Room 126 Undergraduate Learning Center
3:00 - 4:00 PM	Awards Ceremony	Room Room 126 Undergraduate Learning Center

4th ANNUAL

COURI SYMPOSIUM

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Guest Eminent Speaker

Rob La Frenais, Ph.D.

Curator of Art Catalyst, London

Dreaming the Theory: How Artists and Scientists Collaborate

Dr La Frenais has been a contemporary art curator for 26 years, working internationally with artists entirely on original commissions. He believes in being directly engaged with the artist's working process, while actively widening the context within which the artist can work. He has worked closely with artists such as James Turrell, Marina Abramovic, Isaac Julien, Cornelia Parker, Mona Hatoum, Stelarc, Steve Kurtz, Aleksandra Mir, Ashok Sukumaran, Marko Pelijhan and Tomas Saraceno as well as many other established and emerging artists, working for European Cities of Culture in Glasgow and Madrid, directing the Belluard-Bollwerk Festival in Switzerland and curating a major program 'The Incident', featuring James Turrell and others, for the ICA in London in 1996.

For the last 16 years he has been based at The Arts Catalyst, a UK Arts Council National Portfolio organization in London, where, along with director Nicola Triscott he has built up an unparalleled creative team which has been responsible for some of the most innovative exhibitions and events, based on interactions between art and science, in the world. He has recently given keynote lectures and chaired panels at the Museum of Image and Sound, Sao Paulo, Tate Britain, Centre Pompidou, Metz, The Exploratorium, San Francisco, Sabanci University Istanbul, Dundee Contemporary Arts, Laboratoria Al Almeda Mexico City, Edinburgh University, Nottingham Contemporary, ISEA 2011 and 2012. As well as producing site-based works, The Arts Catalyst collaborates with institutions such as the European Space Agency, the Natural History Museum, the Science Museum, Tate Britain and the Roundhouse. His most recent exhibition, Republic of the Moon, opened this year in Liverpool and is now touring internationally. He was given an honorary Doctorate by Dartington College of Art in 2005 and in 2006 completed a practice- based PhD at Brunel University on issues around curating.

Before become a curator in 1987 he founded and edited the influential contemporary cultural journal Performance Magazine in 1979, editing and writing criticism internationally during the eighties. He spent most of the seventies as an artist carrying a Sony portapak, editing with early video technology and working in community contexts with the group Action Space. As well as showing his work in The Video Show at the Serpentine he also showed at De Appel in Amsterdam and the Akademie De Kunste in Berlin. He shot the first use of police riot shields in the UK during the eviction of Huntley Street, later used in early pop videos by the group Crass.

He was also the first curator ever to experience zero gravity, with a group of artists, at Star City in Moscow in 1999 and went on, with the Arts Catalyst to enable around 50 artists (and scientists) to work in an environment previously only experienced by astronauts and space scientists.

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Guest Eminent Speaker

Luis Echegoyen, Ph.D.

Robert A. Welch Chair Professor of Chemistry,
University of Texas at El Paso

Science & Serendipity:
From the Discovery of New Carbon Materials to the Nano Revolution

Luis Echegoyen is the Robert A. Welch Chair Professor of Chemistry at the University of Texas at El Paso since August, 2010. He was the Director of the Chemistry Division at the National Science Foundation from August, 2006 until August, 2010 where he was instrumental in establishing new funding programs and research centers. He was also a Professor of Chemistry at Clemson University in South Carolina, where he maintained a very active research program with interests in fullerene electrochemistry, monolayer films, supramolecular chemistry, and spectroscopy; endohedral fullerene chemistry and electrochemistry; and carbon nanoonions, synthesis, derivatization and fractionation. He served as Chair for the Department of Chemistry at Clemson from 2002 until his NSF appointment. Luis has published around 380 research articles and 43 book chapters. He was elected Fellow of the American Association for the Advancement of Science in 2003 and has been the recipient of many awards, including the 1996 Florida ACS Award, the 1997 University of Miami Provost Award for Excellence in Research, the 2007 Herty Medal Award from the ACS Georgia Section, the 2007 Clemson University Presidential Award for Excellence in Research, and the 2007 University of Puerto Rico Distinguished Alumnus Award. He was also selected as an ACS Fellow in 2011 and was the first recipient of the ACS Award for Recognizing Underrepresented Minorities in Chemistry for Excellence in Research & Development, also in 2011. He is a coveted speaker who has to his record over 360 scientific invited lectures and presentations.

Luis was born in Habana, Cuba in 1951. His family moved to Puerto Rico in 1960, where he spent his formative years. He received a BS in Chemistry and a Ph.D. in Physical Chemistry from the University of Puerto Rico, Rio Piedras. He was a post-doctoral fellow at the University of Wisconsin, Madison, and a research scientist at Union Carbide Corporation in New Jersey. Realizing that his vocation was in academic research and teaching, he returned as Assistant Professor to the University of Puerto Rico in 1977. Luis served as Program Officer in the Chemical Dynamics Program at NSF in 1981 and held a simultaneous Adjunct Associate Professor position at the University of Maryland, College Park. He moved to the University of Miami in 1982, where he served for 18 years. While at Miami, he took two very rewarding sabbatical leaves: one at Louis Pasteur University in Strasbourg, France in 1990, where he collaborated with Professor Jean-Marie Lehn, 1987 Nobel Price Winner in Chemistry, and a second one at the ETH in Zurich, Switzerland in 1997, where he worked with Professor Francois Diederich. Luis maintains active research collaborations with researchers in Spain, Italy, France, Germany, Switzerland, Japan, China and all across the US. He has been continuously funded since the start of his academic career and is proud to have directed the research of a very large number of undergraduate and graduate students all of whom have gone on to successful academic, professional, and industrial careers.

4th ANNUAL

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Guest Eminent Speaker

Herb Childress, Ph.D.

Director of Metaphor, Teleidoscope Group, LLC

Wicked Problems: Why All of You Are Architecture Majors

Herb Childress is the Director of Metaphor at Teleidoscope Group, a consulting firm offering guidance to clients in higher education and other non-profit arenas. Prior to launching Teleidoscope, Herb was Dean of Research and Assessment at the Boston Architectural College, and a Mellon Lecturing Fellow in the Thompson Writing Program at Duke University.

He received his BA in Architecture from the University of California at Berkeley, and his Ph.D. in Architecture (Environment-Behavior Studies) from the University of Wisconsin-Milwaukee. His research investigates the ways in which people build emotional relationships with places in their lives, and he has particularly focused on the spatial and emotional Lives of teenagers and young adults. His book Landscapes of Betrayal, Landscapes of Joy: Curtisville in the Lives of its Teenagers focused on the young people of one small community, looking at the ways teens thought about their homes, their cars, their school and their neighborhoods.

Herb has been a leader with the Council on Undergraduate Research for over ten years, and always looks for ways to help students become active makers of their own knowledge. He is also a trained billiards instructor, and believes in the power of focused attention to ease troubled minds.

4th ANNUAL COURI SYMPOSIUM SPRING 2014

STANLEE & GERALD RUBIN CENTER FOR THE VISUAL ARTS

Showcasing Emerging Researchers, Scholars and Artists

Technical Program

Art Exhibition

ARTIST NAME	TITLE	MEDIA
Aceves, Yvonne	*Caged/ Enjaulado*	Graphite on paper/ Grafito en papel
Acosta , Kiani	*Blue Wire/ Cable Azul*	Colored pencil/ Lápiz de color
	Green Wire/ Cable Verde	Colored pencil/ Lápiz de color
	Lights/ Luces	White conte/ Conte Blanco
	Connections/Conexiones	White conte/ Conte Blanco
Alvarez, Luca	*Take Me There/ Llevame allí*	Mixed media/ Técnica mixta
Brice, Kristin	*Carving Identity I, II/ Tallando la Identidad*	Tempera on tar paper/Témpera sobre papel de alquitrán
Corchado, David	*Untitled/ Sin Título*	Oil on canvas/ Óleo sobre lienzo
Erives, Marcela	*Ratatulota*	Ceramics/ Cerámica
Francis, Jordan	*Feet of Clay/ Pies de Barro*	Porcelain & mixed media/ Porcelana y técnica mixta
Garnica, Staphany	*Espacio Gris y Aparejo a Soga*	Mixed media/ Técnica mixta
Johnson, Barry	*Decay/ Decadencia*	Coal & concrete/ Carbón y cemento
	Red Ship/ Barco Rojo	Coal & concrete/ Carbón y cemento
	Untitled/ Sin Título	Sponge & concrete/ Esponja y cemento
Lucero , Jason	*Landscape 12, 13/ Paisaje 12, 13*	Monotype on intaglio print/ Monotipo impresión intaglio
Macias, Chris	*Young Buck in a Big New World Serie/ Joven Buck en una Seria Grande del Nuevo Mundo*	Screen print/ Serigrafía
Marquez, Esteban	*Cabeza de Hannah Montana*	Video
Mawson, Heather	*Questions/ Preguntas*	Video installation performance/ Performance videoinstalación
Maynard, Richard	*Unrecognizable Sound/ Sonido Irreconocible*	Wood & polychoid/ Madera y polychoid
	Measure Interruption/ Medir la Interrupción	Clay, steel & fabric/ Barro, acero y tela
Menchaca , Patricia	*Can you Reach Me?/ Me Puedes Contactar?*	Color pencil on illustration board/ Lápiz de color en papel de ilustración
	Sprouting/ Brotación	Color pencil on illustration board/ Lápiz de color en papel de ilustración
	Thread Water/ Aguas de Hilo	Color pencil on illustration board/ Lápiz de color en papel de ilustración

Moreno, Rebeca	*Duality/ Dualidad*	Oil on wood/ Óleo en madera
Moreno, Cristina	*Liebres*	Clay/ Barro
Murillo, Jorge	*Untitled/ Sin Título*	Sterling & geode/ Esterlina y geode
Ochoa, Briseida	*Sueño 27*	Oil, acrylic, paper, paint on canvas/ Óleo, papel, pintura en lienzo
	La Bestia	Inkjet on velum, screen print of fabric panel & metal/Impresión en velo, serigrafía en tela y metal
Olivas, Gabriella Nicole	*White Eyes to the Moon/ Ojos Blancos a la Luna*	Digital media/photography/ Medio digital/ fotografía
Oñate, Adriana	*Fragments of Interpretation/ Fragmentos de Interpretación*	Sculpture/Installation, screen-print/ Escultura/instalación, serigrafía
	An Exploration of the Body as Meat/ Una Exploración del Cuerpo como Carne	Lithograph/ Litografía
	These Hams Aren't Going to Eat Themselves/Estos Jamones No Se Van a Comer Ellos Mismos	Sculpture/Installation, projection, screen-print/ Escultura/ Instalación, proyección, serigrafía
Padilla, David	*Timeline of Confidenc/ Cronología de Confianza*	Drawing/ Dibujo
Palma, Yennifer G	*Robin*	Latex, acrylic & oil paint on canvas/ Látex, acrílico, óleo sobre lienzo
Palma, Lionel	*Victor*	Oil on canvas/ Óleo sobre lienzo
Palma, Lionel & Yennifer	*Contained/ Contenido*	Oil on canvas/ Óleo sobre lienzo
Perea, Alejandro	*Yellow Stick/ Palo Amarillo*	Ceramics & steel/ Cerámica y acero
Piña, Juan D	*Drawing of a Sculpture/ Dibujo Sobre Una Escultura*	Sculpture (paper & pencil)/ Escultura (papel y lápiz)
Quiroz, Giovanni	*Untitled/ Sin Título*	Red chalk, charcoal, pastel & wood/ Tiza roja, carboncillo, pasteles y madera
	Untitled/ Sin Título	Red chalk, charcoal, pastel & wood/ Tiza roja, carboncillo, pasteles y madera
Saenz, Diana	*Shape Necklace (Series)/ Forma de Collar (Serie)*	Cooper, metallic/aqua powder coat/ Cobre, capa de polvo aqua/metálico
Silva, Nicolas	*Biofilm I*	Painting/ Pintura
Turon, Laura	*Memories (age7)/ Memorias (Edad 7)*	Paper and acrylic on sheetrock/ Papel y acrílico en sheetrock
Uribe, Fabian	*Withholding Truth/ Retención de la Verdad*	Used books, nickel, wood, rebound cover/ Libros usados, níquel, madera, cubierta
Vazquez, Joaquin	*Fire/ Fuego*	Wood cut and color ink/ Corte de madera y tinta de color
Wall , Joshua	*Let's Spread the Human Plague/ Vamos Difundir la Peste Humana*	Pencil on mat board/ Lápiz sobre papel
Zubia , Martin	*Stereotype/ Estereotipo*	Spray paint on canvas/ Pintura aerosol sobre lienzo

4th ANNUAL

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Technical Program

POSTER SESSION

Biomedical, Behavioral & Social Sciences

Poster No	Title and Authors
1A	**Differences in self-efficacy and motivations to exercise in resistance trained and untrained young adults** *Ashley V. Alvidrez^, Sandor Dorgo*, Ashley Bangert**
2B	**Sex and aggression: a study of sexual attitudes, behaviors, and experiences among college students** *David J. Anderson^, Oscar Beltran, Kathryn Schmidt, Brenda Risch**
3A	**The social stigmas of obesity and the motivations to be physically active** *Alan A. Arredondo^, Karen I. Barraza, Rick Garza, Valerie Gutierrez, Adrian Mendez, Daniela Sanchez, Guillermina Nuñez**
4B	**Psychopathic honor** Theresa M. Benavidez^, Adon L. Neria, Daniel Jones*
5A	**Sub-study: A randomized, double-blind, pivotal phase 3 study of paromomycin + gentamicin topical cream and paromomycin alone topical cream for the treatment of cutaneous leishmaniasis in Panama** *Munir H. Buhaya^, Alejandra Escareno, Nestor Sosa**
6B	**Anthropometric measurements in elderly Ecuadorians in Atucucho, Quito, Ecuador** *Esmirna Corona^, Areli Guajardo, Gabriel Ibarra-Mejia**
7A	**Effects of acute and repeated emotional stress on mechanisms of cognitive function** *Jiselle J. Del Cid^, Juan M. Bolaños, Kristina Barron, Kristin Gosselink**
8A&B	**In vitro and in vivo analysis of breast cancer cell lines** *Alejandra E. Gallegos ^, Sarah N. Jallad^, Paloma Valenzuela, Karla Parra, Natzidielly Lerma, Courtney Becerill, Cynthia Rodriguez, Giulio Francia**
9A	**Perspectives of novice teachers and their mentors: teaching literacy/bi-literacy to Mexican immigrant children in a border city** *Maricela Garcia^, Judith Munter**

10B **Does knowledge of concussion symptoms influence an athlete's self-report of a history of concussion?**
*Kara A. Greco^, John Pfirman, Anthony Salvatore**

11A **Environmental determinants and community participation in the population of the Canton of Alvarado and the Central Canton of Cartago**
Jasmine Guerra^, Melissa Gonzalez, Alejandra Villalobos, Roy Sibaja, Esteban Vega, Luisa Chavarria, Mabel Granados, Gabriel Ibarra*

12B **The role of insulin in enhanced vulnerability to nicotine use in diabetic rats**
Cecilia A. Hinojosa^, Joesph A. Pipkin, Rodolfo Flores, Christian Tejeda, Laura O'Dell*

13A **Regulation of pediatric T-cell acute lymphocytic leukemia cells in the invasion of the central nervous system**
Brenda E. Hinojoza^, Moshe I. Katz, Charlotte Vines*

14B **UTEP-1, a UTEP derived human cancer cell explant obtained from the tumor of a patient from the El Paso area**
Natzidielly Lerma^, Karla Parra, Paloma Valenzuela, Chantal Vidal, Alejandra Gallegos, Armando Varela, Hector Zepeda, Giulio Francia*, Renato Aguilera*

15A **Citizenship, ethnicity and environmental justice: pinpointing the social vulnerabilities of Hispanic immigrants**
Alejandra Maldonado^, Timothy Collins*, Sara Grineski*

16B **Dopamine D2 receptor plays a key role in sleep and circadian activity**
Ivan Mercado^, Paul Sabandal, Kyung-An Han*

17A **Establishment of a fresh human tumor bank at UTEP**
Irving Miramontes^, Karla Parra, Paloma Valenzuela, Sarah Jallad, Urban Emmenegger, Gudmundur Thordarson, Hector Zepeda, Renato Aguilera, Giulio Francia*

18B **An in vitro system to analyze NKT cell-mediated suppression of inflammatory cytokine production following F. Tularensis infection**
Noel Molina-Limon^, Nicole R. Setzu, Mireya Ramos, Charles Spencer*

19A **The punishment you deserve: how a deity and the situation influence your decisions.**
Roberto A. Moran^, Brandt A. Smith, Michael Zarate*

20B **Self-respect and its importance to Rawls' theory of justice**
Sharon Murillo^, Caroline Arruda*

21A&B **A potential alternative therapy for influenza**
Beu P. Oropeza^, Jourdan D. Harper^, Katherine Meraz, Jason Chacon, German Rosas-Acosta*

22B **Evaluating the effectiveness of a drinking-water treatment plant in removing intestinal parasites**
Ricardo Parra^, Melissa Solano*

23A **Young El Paso women's contraceptive knowledge, use and access**
Miren M. Pena^, Ophra Leyser-Whalen*

24B **Chemoarchitecture of the mammalian hypothalamus: mapping of three peptidergic neuronal populations (a-MSH, nNOS, and MCH) in the lateral hypothalamic area and surrounding regions**
Kristen K. Pennington^, Claire E. Wells, Arshad Khan*

25A **Inequality in cervical cancer incidence in Costa Rica: 1999-2008**
Elizabeth Preza^, Carolina Santamaria-Ulloa*

26B **Chronic stress decrease mitochondrial content in rat skeletal muscle**

	Ricardo M. Rodriguez^, Luisa F. Valverde, Seth Beltran, Ellen Walker, Armando Varela, Arshad Khan, Kristin Gosselink, Sudip Bajpeyi*
27A	**Autism spectrum disorder awareness** Nicole M. Sepulveda^, Gita Upreti*, Robert Trussell*
28B	**The situation of the elderly population of the Guido de Desamparados in San Jose, Costa Rica** Viridiana Sigala^, Gabriel Ibarra-Mejia*
29A	**Racial/ethnic identities and the success of Hispanic students at a Hispanic serving institution** *Angela J. Silva^, Aurelia L. Murga**
30B	**Role of the 2-on-2 hemoglobin HbN for infectivity and persistence of Mycobacterium tuberculosis** *Jonathan Vazquez-Perez^, Veronica Escalante, Hugues Ouellet**
31A	**Effects of vibration training on reducing risk of falls among Hispanic older adults** *Chelsea R. Villa^, Feng Yang**
32B	**Layali Al-Sham: Contextualizing bi-musicality in cultural exchange programs** *Leslie N. Yapor^, Andrea L. Shaheen**

Chemistry & Biochemistry

Poster No	*Title and Authors*
33A	**Effects of n-terminal acetylation on the pore formation of Mycobacterium tuberculosis ESAT-6 protein** *Javier A. Aguilera^, Qi Zhang, Yue Ma, Jianjun Sun**
34B	**Synthesis and characterization of new Fe and Cu nanoparticle hydrogels** *Miguel A. Algara^, Sudheer K. Molugu, Juan Noveron**
35A	**Expression of an early gene product of the avian adenovirus CELO for structural and functional studies** *Christina Alvara^, Gustavo Avila, Chuan Xiao**
36B	**Identification of G beta-gamma subunit interacting proteins in PC12 cells by mass spectrometry** *Amaris Castanon^, Emma Arigi, Jorge Sierra-Fonseca, Jessica Martinez, Cynthia Carreon, Igor Almeida, Sukla Roychowdhury**
37A	**Synthesis of 1-palmitoyl-dihydroxyacetone phosphate and cloning of the alkyl-dihydroxyacetone phosphate synthase of Trypanosoma cruzi** *Efrain M. Castillo^, Felipe G. Lopes, Esteban Cordero, Nasim Salloum, Joaquin De Leon, Igor C. Almeida, Katja Michael**
38B	**Bioinspired chromatin-analogues for making antibacterial plastics** *Eduardo E. Chaib^, Tarikul Islam, Delfina Dominguez*, Juan Noveron**
39A	**Structural study of the circadian clock protein BMAL1** *Jennie Choi^, Chuan Xiao**
40A&B	**The reduction in estrogen receptor-beta expression reduces growth rate of breast cancer cells in response to hormonal stimulation** *Lisett Contreras^, Diana Herrera, Adrian Lujan^, Sarah Abu-Issa, Itzel Zambrano, Juan A. Delgado, Cynthia Gabaldon, Gudmundur Thordarson**
41A	**Electronic communication in bimetallic compounds** *Benjamin A. Duran-Tobias^, Dino Villagran**

42B **Cholesterol side-chain degradome of Mycobacterium tuberculosis**
*Veronica Escalante ^, Johnathan S. Abou-Fadel, Yolva Loya, Olga Soto, Juancarlos Ruiz, Hugues Ouellet**

43A **Synthesis and characterization of nano-micellar metallic organic frameworks**
*Juan V. Fernandez^, Gabriel A. Gonzalez, Juan Noveron**

44B **Super bulky guanidinates for the synthesis of molecular, titanium nitrides as well-defined precursors for titanium nitride semiconducting thin films for application in dye-sensitized solar cells**
*Leonel Griego^, Arnab Maity, Skye Fortier**

45A **One-pot synthesis of indole-4,7-diones from quinones**
*Jorge D. Guerra^, Quang H. Luu, Shizue Mito**

46B **SGT-alpha: a novel therapeutic target for prostate cancer**
*Omar Gutierrez^, Yenni Garcia, Marc Cox**

47A **Synthesis of hydrogen-bonding triphenylamine derivatives for the preparation of electron donor-acceptor networks**
*Taylor S. Harmon^, Alex Jimenez, Jose Nunez**

48B **Electron spin resonance (ESR) spectroscopic studies of endohedral fullerenes**
*Gustavo Hernandez^, Luis Echegoyen**

49A&B **Synthesis and characterization of novel acylated quinonlinediol aluminum (III) complexes**
*Anwar Jacinto-Moreno^, Salvador A. Fernandez^, Brian Jacinto, Shizue Mito**

50B **Mechanistic investigation of small molecules with antioxidant properties as radical inhibitors**
Diandra A. Licon^, Carl Dirk, Rachid Skouta**

51A **Bisphenol A removal from water using activated carbon-alginate and bentonite-alginate beads**
*Alma L. Loya-Posada^, Wah Tzu Teoh, Wen-Yee Lee**

52B **Mechanism of Na-D-beta-hydroxybutyrate neuroprotection and combination therapy with ellagic acid**
*Jose E. Marin^, Parijat Kabiraj, Mahesh Narayan**

53A&B **Large-scale molecular dynamics simulation of stereo-lithographically 3-D printed zinc(II)-containing polymers**
*Michael X. Miranda^, Shakooh Bahadorzadeh^, Mireya Perez, Ryan Wicker, Juan Noveron**

54B **Structural and functional studies of circadian rhythm protein human cryptochrome1**
*Jasmine Peralta^, Gustavo A. Avila, Chuan Xiao**

55A **In search of efficient drugs against Trypanosoma cruzi**
*Andrea Perez^, Eva Iniguez, Rosa Maldonado, Thadeau Costa, Rachid Skouta**

56B **Investigating the role of the DNA repair proteins Ku80 and Poly (ADP-ribose) polymerase-I in the HIV-1 life cycle**
*Andre F. Perez-Orozco^, Sandra A. Salinas, Eduardo Urias, Angelica Lopez, Manuel Llano**

57A **Electrooxidatively polymerized hole transporting layers in organic-inorganic solar cells**
*Paulina A. Quinonez^, Danisha M. Rivera-Nazario, Agustin Molina-Ontoria, Luis Echegoyen**

58B **Synthesis of Co/MoS2 catalysts supported in novel carbon source for hydrodesulfurization reactions**
*Adriana Ramirez^, Brenda Torres, Maryam Zarei, Russell Chianelli**

59A	**Potential use of withaferin A, psoralidin, and Fer-1 analogs, as preventive treatments for Parkinson's & Alzheimer's diseases** *David A. Ramirez^, Rachid Skouta, Mahesh Narayan**
60B	**Identifying small molecules targeting FKBP52 as a novel treatment for prostate cancer** *Paola A. Ramos^, Naihsuan C. Guy, Marc Cox**
61A	**Large-scale molecular dynamics study on carbon nanotube polymer composites** *Erica V. Rodarte^, Juan C. Noveron**
62B	**The synthesis and assessment of metal detecting fluorophores** *Laura I. Saucedo^, Robinson Roacho, Alejandro Metta Magana, Keith Pannell**
63A	**Electronic communication in covalently linked mixed-valent compounds** *Mark B. Smith^, Nancy Rodriguez, Dino Villagran**
64B	**PCBM methano derivatives of Sc3N@Cn (n = 68, 78, 80) and empty fullerene bis-adducts as acceptors for OPV devices** *Juan A. Valdez-Moreira^, Maira R. Ceron, Marta Izquierdo Barroso, Luis Echegoyen**
65A	**Design and biological evaluation of anti-epileptic probes** *Carlos A. Valenzuela^, Abahis Tena, Rachid Skouta*, Karine Fenelon**

Computer Science, Engineering, Physics & Mathematics

Poster No	*Title and Authors*
66B	**Design of an indirect super-critical carbon dioxide super-heater for solar power towers** *Alexandra Alcantara Guardado^, Jesus D. Ortega, Vinod Kumar**
67A	**The effect of processing variables on the fabrication of titanium-doped tungsten oxide thin films.** *Brittney Brown^, Mirella Vargas, Ramana V. Chintalapalle**
68B	**Analysis of ferroelectric ceramics fabricated by binder jetting technology** *Monica A. Cadena^, Sara M. Gaytan, Yirong Lin, Ahsan Choudhuri, Ryan Wicker**
69A	**Computational modeling of a high temperature direct tubular receiver design for supercritical carbon dioxide Brayton cycle** *Alejandra G. Castellanos^, Jesus D. Ortega, Vinod Kumar**
70B	**Development of a metamaterial based, low-cost, passive, wireless temperature sensor for harsh environment applications** *Diego I. Delfin^, Hasanul Karim, Mohammad Shuvo, Monica Cadena, Sara Gaytan, Ryan Wicker, Ahsan Choudhuri, Yirong Lin**
71A	**Automatic detection of first arrivals in seismic traces using a Fourier approach** *Manuel E. Dosal^, Olac Fuentes**
72B	**Improvement of prosthetic foot designs by developing a mechanical testing protocol** *Victor H. Duenas^, Aaron Nystrom, Roger Gonzalez**
73A	**Air cooled condensers and the application of metal foam on the condenser tubes** *Alan A. Esparza^, Norman D. Love**
74B	**Three-dimensional shear wave model development of the Texas region using an optimization scheme** *Victor H. Garcia^, Lennox E. Thompson, Aaron Velasco**
75A	**Electronic structure of dye-functionalized fullerenes for use in organic**

photovoltaics
*Amanda S. Garnica^, Rajendra Zope, Tunna Baruah**

76B **Visualization of PROV-O based provenance using data driven documents (D3)**
*Joshua J. Grajeda^, Nick Del Rio, Natalia Villanueva Rosales**

77A **Quantification of Mycobacterial phagosomal rupture in macrophages with fluorescence energy transfer microscopy**
*Christian Honsaker^, Yassel Acosta, Qi Zhang, Jianjun Sun, Chunqiang Li**

78B **Characterization of titanium doped tungsten oxide thin films for photovoltaic applications with variant temperatures**
*Diego M. Lopez^, Ernesto J. Rubio, Mirella Vargas, Chintalapalle V. Ramana**

79A **Titanium incorporated WO3 films for photovoltaic device applications**
*Gabriel A. Lopez^, Mirella Vargas, Ernesto Rubio, Chintalapalle V. Ramana**

80B **Hybrid material design for cryogenic fuel tanks**
*Jose E. Melendez^, Md S. Islam, Pavana Prabhakar**

81A **Unsupported NiMoS2 and NiMnMoS2 catalysts prepared by hydrothermal decomposition of ammonium thiomolybdates for hydrogenation of cyclohexene**
*Javier Mendiola^, Maryam Chaleshtori, Brenda Torres, Russell Chianelli**

82B **Investigation of tungsten doped gallium oxide for high temperature oxygen sensors**
*Alejandro Miranda^, Ernesto J. Rubio, Chintalapalle V. Ramana**

83A **Developing an inspection protocol for automatic feedback control in electron beam melting**
*Jessica Montes^, Heimdall Mendoza, Sara Gaytan, Jorge Mireles, David Espalin, Ryan Wicker**

84B **Fabrication and characterization of tungsten films made by sputter-deposition**
*Adbeel J. Moreno Tarango^, Gustavo Martinez, Chintalapalle V. Ramana**

85A **Developing a prosthetic device to facilitate mobility in the developing world**
*Daniela Natera^, Aaron Nystrom, Roger Gonzalez**

86B **Study of Cd and Te diffusivities on CdS and SiO2 by atomistic simulations**
*Emmanuel Ochoa^, Sergio Almeida, Jose Chavez, Xiao Wang Zhou, David Zubia**

87A **Charge transfer excited states of complexes of ZnTPP with dye-attached fullerenes**
Marina L. Paggen^, Amanda Garnica, Luis Basurto, Rajendra Zope, Tunna Baruah**

88A&B **An exploratory analysis of agent characteristics**
*Alex M. Rayon^, Adriana C. Camacho^, David Novick**

89A **Fabrication and testing of wireless temperature sensor for energy systems applications**
*Salvador Sandoval Vazquez^, MD Rashedul H. Sarker, Yirong Lin, Norman Love**

90B **Performance optimization of high performance computing applications via PerfExpert**
*Garrett J. Shaw^, Esthela Gallardo, Patricia Teller**

91A **Orientational dependence of charge transfer excitation energy in tetracene-C60 and rubrene-C60 complexes**
Ember L. Sikorski^, Luis Basurto, Tunna Baruah, Rajendra Zope**

92B **Semantic-enhancement of a content management system: Data integration from an external source**
*Karina Valtierra^, Aida Gandara, Natalia Villanueva-Rosales**

93A	**Selective-area growth of CdTe/ZnTe on micro patterned- SiO2/CdS/ITO/glass substrates for record breaking solar cells** *Aldo I. Vidana^, Damian Marrufo, Brandon Aguirre, Rodolfo Aguirre, John McClure, Jose Cruz-Campa, David Zubia**

Environmental & Geological Sciences

Poster No	Title and Authors
94B	**Interannual differences in tundra microtopography is correlated with phenological variation of vegetation** *Raul Armendariz Jr.^, Sergio Vargas, Ryan Cody, Mayra Melendez, Craig Tweedie**
95A	**Hydrological and geophysical investigation of the effect of surface and groundwater flow on the El Paso Keystone Wetlands** *Samira G. Armijos^, Diane I. Doser**
96B	**Comparing orthopteran diversity between perennial and ephemeral water sources and open desert on Indio Mountains Research Station, Hudspeth County, Texas** *Sara E. Baqla^, Geoffrey H. Wiseman, Jerry Johnson**
97A	**Comparison of recapture rates between parthenogenetic Aspidoscelis tesselata and gonochoristic Aspidoscelis marmorata (Squamata: Teiidae) on Indio Mountains Research Station, Hudspeth County, Texas, USA** *Allyson D. Benson^, Gabriela R. Franco, William Lukefahr, Jerry Johnson**
98B	**Molecular taxonomy and ecology of the crab hole mosquito (Culicidae: Deinocerites) in Panama** *Angie Betancourt^, Jose Loaiza**
99A	**Application of refraction seismology techniques and simple Bouguer corrections to gravity readings to interpret the subsurface geologic structures of southwestern El Paso** *Joel G. Castro^, Diane I. Doser**
100B	**Climate change and genetic variation in a tropical reef dwelling crustacean, Mysidium gracile** *Rosaura J. Chapina^, Jennifer C. Ramos, Elizabeth Walsh**
101A	**Geophysical analysis of seismicity in the Matanuska-Susitna Valley region near Anchorage, Alaska** *Chloe O. DesVoignes^, Diane Doser**
102B	**Systematics, phylogeography and species discovery in the Australian angiosperm genus Gonocarpus (Haloragaceae)** *Michelle Garcia^, Michael L. Moody**
103A	**Using sequential extraction and mass spectrometer to determine U distribution in soils from Basse-Terre, Guadeloupe: Implications for understanding chemical weathering in a tropical climate** *Sandra Garcia^, Peter Sak, Heather Buss, Susan Brantley, Lin Ma**
104B	**Applications of bioinformatics tools for identification of arsenic detoxification enzymes in rotifers** *Edgar Jauregui^, Kayla I. Hinson, Elizabeth Walsh**
105A	**Determining soil changes within an alfalfa field using electrical conductivity measurements**

	*Marc A. Lucero^, Diane Doser**
106B	**Wind as dispersal mechanism for aquatic invertebrates in the North American desert southwest** *Maite Martin^, Jose A. Rivas, Kayla Hinson, Michael Moody, Elizabeth Walsh**
107A	**Mapping soil variations using magnetic geophysical methods to determine their effects on crop production** *Isaac A. Martinez^, Diane Doser**
108B	**Assessing the effects of nutrient enrichment in arctic aquatic ecosystems** *Yolanda J. Olivarez^, Vanessa L. Lougheed**
109A	**Cryptic speciation in aquatic invertebrates: case study of sessile rotifers** *Elizabeth Preza^, Azar Kordabacheh, Elizabeth Walsh**
110B	**Systematics of African limbless skinks (Squamata: Scincidae) of the genus Melanoseps** *Waleeja Rashid^, Maria F. Medina, Edward Stanley, Michele Menegon, Marie Nguyen, William Branch, Eli Greenbaum**
111A	**Surveillance of mosquitoes for arthropod-borne viruses in El Paso County, Texas** *Albert Soliz^, Lee Sewell, Celinda Crews, Pedro Palermo, Douglas Watts**
112B	**Effects of flood irrigation on soil quality in West Texas: another way of how humans are changing the world** *Emmanuel Sosa^, Sandra Garcia, Lixin Jin**
113A	**Systematics of the genus Lygodactylus from Democratic Republic of the Congo** *Samantha Stewart^, Thornton Larson, Eli Greenbaum**
114B	**The effects of permafrost thaw on long-term nutrient release into Arctic Tundra ponds** *Aracely Tellez^, Vanessa L. Lougheed**

Pre-Research

Poster No	*Title and Authors*
115A	**Creating a closed-loop recycling system for waste materials involved in fused deposition modeling, and studying the degradation of those materials** *Joel English^, David Roberson**
116B	**Production of endohedral metallofullerenes (EMF)** *Miguel A. Guerrero-Ayala^, Chian-Hsiang Chen, Luis Echegoyen**
117A	**Smashing ions to unveil the secrets of our building blocks: a brief outline of the RHIC experiments at BNL and the efforts to explain them** *Erin A. Hodson^, Vivian Incera**
118B	**Synthesis and photochemical reactions of 1,4,5,8-anthracenetetrone** *Ai S. Pastrana^, Shizue Mito**
119A	**An anomaly in the proton radius: New insight in quantum electrodynamics** *Brian Zamarripa-Roman^, Efrain J. Ferrer**

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Abstract Finder

Biomedical, Behavioral & Social Sciences

Biomedical, Social & Behavioral Sciences

Differences in self-efficacy and motivations to exercise in resistance trained and untrained young adults.

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Previous studies have shown that individuals who engage in physical activity show higher self-efficacy compared to individuals who do not exercise regularly. Studies primarily focused on general physical activity engagement; therefore, it is unclear whether a similar relationship would exist between self-efficacy and resistance training. The purpose of this project was to determine whether engaging in regular resistance training is associated with higher self-efficacy and motivation to exercise. Fifty-two young adults (mean SD age: 23.45 3.88) were assessed for their exercise behavior and level of fitness, and classified either as resistance trained or untrained. Subjects' self-efficacy and motivational behavior were then assessed by the general self-efficacy (GSE), the motives for physical activity measure-revised (MPAM-R) consisting of five objectives (interest, competence, appearance, fitness & social) and physical exercise self-efficacy (PESE) surveys. Data were analyzed using independent t-tests to assess group differences (trained vs. untrained) on the self-efficacy and motivation measures. Although group differences were mostly statistically non-significant, a trend towards group differences was observed for the GSE (p=0.0564) and MPAMAppearance (p=0.0608) measures. Significant group differences were observed for the MPAMInterest (p=0.0001) and MPAMCompetence (p=0.0126) measures. Our findings suggest that resistance training fitness level is associated with specific motivations for exercise and seems to suggest a relationship with self-efficacy measures. Though our study found some trends relating to resistance training, self-efficacy and motivational behavior, future studies may include direct manipulation of training to assess whether resistance training can produce changes in self-efficacy and motivational behavior.

Recommended Citation:
Alvidrez , Ashley ; Dorgo , Sandor ; Bangert , Ashley . "Differences in self-efficacy and motivations to exercise in resistance trained and untrained young adults." (2014). COURI Symposium Abstracts, Spring 2014, ID= 308

Sex and aggression: a study of sexual attitudes, behaviors, and experiences among college students

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Studies indicate that sexual assault, intimate partner violence (IPV), and domestic violence are growing problems among college students. Alcohol is involved in up to three quarters of sexual assault, but lower rates have been found among students at the University of Texas at El Paso (UTEP). This study was designed with both evaluative and exploratory components. The chief research question was what relationship exists between the attitudes, experiences, and behaviors of students regarding sexual aggression, power, dominance and control in relationships. In randomly selected classroom samples, 1332 students, 808 (60.7%) female, 2 (.2%) intersex, completed anonymous surveys regarding their demographics, attitudes, sexuality, and experience of assault or aggression in both romantic and family relationships. Preliminary results indicate a variety of kinds of non-consensual sexual activity including incidents of unwanted sexual attention before age 16 and non-consensual first sexual experiences at any age. As in other studies, many respondents said that they have consumed alcohol or other drugs to enable themselves to have sex while a small number reported offering other people substances to obtain sex while some people have done both. Interestingly, among a contrasting group, a significant minority report never having had sex or currently being sexually inactive. Relationships and implications are discussed.

Recommended Citation:
Anderson , David ; Beltran , Oscar ; Schmidt , Kathryn ; Risch , Brenda . "Sex and aggression: a study of sexual attitudes, behaviors, and experiences among college students" (2014). COURI Symposium Abstracts, Spring 2014, ID= 406

The social stigmas of obesity and the motivations to be physically active

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The city of El Paso, located on the state of Texas on the border with Mexico, has an 82% Mexican American population known for high obesity and diabetes rates. According to the City's Department of Public Health, El Paso had over 12% of its residents diagnosed with diabetes in 2013 . It also has a higher percentage of overweight adults (39%) compared to Texas (37%) and the U.S. (36%). In the El Paso County, 29% of adults are physically inactive, compared to 13% of Texas adults and 20% of U.S. adults. Obesity can be combated by practicing healthier lifestyles and participating in physical activity at a young age, creating a habitual routine and remaining active when reaching adulthood.

The purpose of this project is to educate youth on obesity, the benefits of physical activity and nutritional recommendations with literature reviewed health modules based on the Centers for Disease Control and Prevention School Health Guidelines to Promote Healthy Eating and Physical Activity. Then, the project will have youth participate in service learning with the city of El Paso's Senior Games to socially motivate youth in the community to become physically active by seeing elder athletes as mentors. The goal is to have youth commit to becoming physically active, live healthier lifestyles, and in turn help the city combat obesity. The project is developed in collaboration with the Center for Civic Engagement and the undergraduate interdisciplinary Youth Board, Students Helping Actively Participate in Exercise, whose mission is to educate, advocate, and achieve physical fitness.

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Psychopathic honor

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In the present study we examine the phenomenon of the "culture of honor" and the degree to which it is driven by dark personalities such as sub-clinical psychopathy, narcissism, and Machiavellianism. "Culture of honor" is the belief that masculine and family honor is tied to female obedience and fidelity to an established set of values. We manipulated the interpersonal closeness (high- vs. low-bond) of male participants to a value-violating confederate to examine its effect on participants' aggression after evaluating their levels of sub-clinical psychopathy, narcissism, and Machiavellianism. We predicted that participants high in both psychopathy and culture of honor will respond to the value-violating female confederate with aggression by giving her more hot sauce in a supposedly irrelevant taste-testing study when they are in the high-bond condition compared to when they are in the low-bond condition. Results show significant differential main effects for the dark personality on our aggression proxy; however the predicted interaction was not supported.

Funding Source: COURI

Recommended Citation:
Benavidez , Theresa ; Neria , Adon ; Jones , Daniel . "Psychopathic honor" (2014). COURI Symposium Abstracts, Spring 2014, ID= 353

Sub-study: A randomized, double-blind, pivotal phase 3 study of paromomycin + gentamicin topical cream and paromomycin alone topical cream for the treatment of cutaneous leishmaniasis in Panama

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Leishmaniasis is the second leading parasitic infection and the 12 leading killer in the world, and it affects approximately 90 tropical and subtropical countries globally. Cutaneous leishmaniasis (CL), endemic in the Republic of Panama, presents approximate 3,000 incident cases with a range of 60-110 per 100,000 individuals per year. Current treatment is expensive, difficult to administer, and toxic; therefore, the study of a topical treatment is important. A randomized, double-blinded phase 3 study on a topical treatment containing paromomycin/gentamicin in comparison to paromomycin is being conducted in Panama against CL. We believe that either of the treatments will have a cure rate of more than 50% on index lesion at day 49 on 3.6% of the sample population. Our results on 11 (3.6%) subjects of the total sample population (300) provide baseline results for the study. The study participants: 8 out of 11 were men, 100% were Hispanic, and the age range was 13-48 years. Enrolled subjects received a 20-day treatment and follow-up on day 20, 35, and 49. The average lesions per subject was 2.3, the average cream tubes used per subject on a 20 day application was 1.35 tubes; and 11 (100%) subjects presented a 100% cure rate on index lesion by day 49. The ongoing study is crucial and its impact on endemic countries is very strong because the benefits of a topical cream increase significantly the treatment of CL. More attention from wealthy countries and organizations is needed since neglected tropical diseases affect primarily poor countries.

Funding Source: NIH

Anthropometric measurements in elderly Ecuadorians in Atucucho, Quito, Ecuador

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The elderly population affronts unique health conditions and challenges and many of the diseases suffered by older persons are the result of dietary factors. Height is the most frequently used anthropometric measure used for the assessment of nutritional status. It is difficult to measure accurate height when working with an elderly population due to the changes in body composition that naturally occurs with the aging process. In the present study, height was directly measured using fiber glass measuring tape and it was compared to an estimated height using the knee-height technique. These two measurements of height were also used to determine if a significant difference exist when using the directly measured height and estimated height for calculation of the Body Surface Area (BSA). A descriptive analytical cross sectional study was conducted with a sample of 40 participants from the elderly community of Atucucho in Quito, Ecuador. Height was measured once with a fiberglass measuring tape and it was also estimated using the knee height technique. For the knee height technique a caliper was used to measure the longitude from heel to knee and the Chumlea's equation was used to estimate the participant's height. BSA was then calculated using the Du Bois formula. A significant difference was found between the means of the directly measured height and the estimated height ($p<.01$). However, no significant difference was found when calculating BSA with the estimated height and directly measured height.

Recommended Citation:
Corona , Esmirna ; Guajardo , Areli ; Ibarra-Mejia , Gabriel . "Anthropometric measurements in elderly Ecuadorians in Atucucho, Quito, Ecuador" (2014). COURI Symposium Abstracts, Spring 2014, ID= 315

Effects of acute and repeated emotional stress on mechanisms of cognitive function

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Exposure to chronic stress decreases cognitive performance, and is linked with immune dysregulation and morphological changes in the brain that may ultimately lead to neurodegeneration. The objective of this project was to evaluate the effects of acute and repeated emotional stress on the expression and localization of protein markers related to cognitive function in rats. Our hypothesis was that repeatedly stressed rats would display higher levels of proteins known to contribute to neurological disorders, compared to acutely stressed rats or non-stressed controls. Adult male Sprague-Dawley rats were exposed to acute (30min x 1d) or repeated (30min/d x 14d) restraint stress, or maintained as unstressed controls. Perfused brain sections were immunohistochemically stained for amyloid beta (A) or hyper-phosphorylated Tau (TAU), while fresh-harvested brain tissues were Western blotted for these same markers. Supporting our hypothesis, our results show stress-induced increases in A expression and accumulation in response to chronic stress, which appears to be reversed when recovery from stress is allowed. Small amounts of TAU were seen in the brains of unstressed rats, with further increases and accumulations indicated in stressed rats. Additional analyses are underway to extend and interpret our findings. In conclusion, we have shown that stress can change the expression of proteins that affect neural function and contribute to pathological states, and that these changes may be transient or long-lasting. Our findings help us understand potential mechanisms through which stress may be linked to impaired learning, and identify different approaches to therapeutic interventions.

Funding Source: Department of Biological Sciences, Border Biomedical Research Center, University of Texas at El Paso

Recommended Citation:
Del Cid , Jiselle ; Bolaños , Juan ; Barron , Kristina ; Gosselink , Kristin . "Effects of acute and repeated emotional stress on mechanisms of cognitive function" (2014). COURI Symposium Abstracts, Spring 2014, ID= 357

In vitro and in vivo analysis of breast cancer cell lines

Alejandra E Gallegos [1^], Sarah N Jallad[2^], Paloma Valenzuela [2], Karla Parra[2], Natzidielly Lerma [2], Courtney Becerill[2], Cynthia Rodriguez [2], Giulio Francia[2]

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We previously reported on the response of human Her-2 positive breast cancer cells grown in immunodeficient mice and treated with anti-Her-2 therapies. We also noted that there are few readily available human Her-2 positive breast cancer models for preclinical studies, namely 231-H2N, BT474 and MDA-MB-361. We hypothesized that a larger repertoire of Her-2 breast cancer cell lines would better reflect the different subtypes of human Her-2 positive breast cancers. To that end we began to study new Her-2 positive cell lines, including HCC1419, which was derived from the breast tumor of a Hispanic patient. We report Western blotting analysis of protein levels of cancer-associated genes (MLH1, MSH3, and Her-2) in breast cancer cell lines and the *in vivo* evaluation of the growth of breast cancer models in mice. We also evaluated the *in vitro* growth of breast cancer cells as monolayers and as three-dimensional tumor spheroids. Thus BT474, MDA-MB-361, and HCC1419, formed highly cohesive spheroids; in contrast, 231-H2N formed loose spheroids. We found that HCC1419 overexpress the Her-2 protein relative to other breast cancer cell lines. We detected the expression of proteins such as MLH1 and MSH3. MDA-MB-361 human Her-2 positive breast cancer cells grow slowly *in vivo* and *in vitro* (though they retain *in vivo* responsiveness to anti-Her-2 antibody therapy; e.g. $p<0.5$ for MDA-MB-361, n=5/group), which was increased by the addition of metronomic (20mg/kg/day) cyclophosphamide. We will present data on the biological diversity of our library of preclinical models to study Her-2 positive breast cancer.

Recommended Citation:
Gallegos , Alejandra ; Jallad , Sarah ; Valenzuela , Paloma ; Parra , Karla ; Lerma , Natzidielly ; Becerill , Courtney ; Rodriguez , Cynthia ; Francia , Giulio . "In vitro and in vivo analysis of breast cancer cell lines" (2014). COURI Symposium Abstracts, Spring 2014, ID= 382

Perspectives of novice teachers and their mentors: teaching literacy/bi-literacy to Mexican immigrant children in a border city

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There are growing numbers of K-12 students in the U.S. public schools whose first language is not English, and many of these students are recent immigrants from Mexico. New teachers may not have the preparation needed to provide effective instruction for these English language learners (ELLs). Very few studies examine novice teachers' experiences as educators of ELL students. Effective teachers in the 21st century need to be well prepared to work with these students, and this study will examine the knowledge and understanding of beginning teachers who are working in schools with large numbers of ELL students. This project was conducted on the U.S.-Mexico border (in El Paso, Texas and Ciudad Juarez, Chihuahua), where Mexican students and families migrate to both sides of the border at different points in time. The research method used in this study was qualitative. Data was collected by conducting interviews, responses to questionnaires, and journal excerpts from two novice teachers and two experienced teachers (mentors). Data analysis was carried out with NVivo 10 software. Preliminary data analysis uncovered common themes. The three themes were: use of native language; relating to students' background; and the importance of quality teachers. The research project expands understanding of the critical role played by novice teachers working with ELL children. The results of this study will expand the knowledge and understanding about this topic by examining the skills and knowledge of novice teachers and their mentors who work with ELL students in public school classrooms.

Recommended Citation:
Garcia , Maricela ; Munter , Judith . "Perspectives of novice teachers and their mentors: teaching literacy/bi-literacy to Mexican immigrant children in a border city" (2014). COURI Symposium Abstracts, Spring 2014, ID= 416

Does knowledge of concussion symptoms influence an athlete's self-report of a history of concussion?

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The incidence of sports related concussion is debatable. While the Centers for Disease Control and Prevention report an extrapolated incidence of 1.6 to 3.2 million recreational/sports related traumatic brain injuries a year, the suspicion is that the incidence is much higher. An important consideration in determining the incidence involves whether an athlete's knowledge of what a concussion is influences their self-reports of prior concussions.

The athletes assessed at the University of Texas at El Paso (UTEP) Concussion Management Clinic are administered the ImPACT test (Immediate Post-Concussion Assessment and Cognitive Testing). The demographic section of the tests asks the athlete to report their prior concussion history. The research question is whether the athlete's knowledge of what a concussion is will influence their report of prior concussions.

A group design compared a Pre-Test Information Group verses Post-Test Information Group of athletes between the ages of 14 to 25 from the El Paso community. The Pre-Test Information Group received information about what a concussion is prior to taking the ImPACT test, and the Post-Test Information Group received the same information after taking the test. Both groups of athletes were also given an anonymous questionnaire after completing the test asking them to report on their concussion history based on the information provided to them. This questionnaire may help to determine if identifying themselves on the ImPACT test influenced their reporting of prior concussions. A Chi-Square analysis yielded no statistically significant differences in the self-reporting of concussion on the anonymous questionnaire.

Recommended Citation:
Greco , Kara ; Pfirman , John ; Salvatore , Anthony . "Does knowledge of concussion symptoms influence an athlete's self-report of a history of concussion?" (2014). COURI Symposium Abstracts, Spring 2014, ID= 311

Environmental determinants and community participation in the population of the Canton of Alvarado and the Central Canton of Cartago

Jasmine Guerra[1^], Melissa Gonzalez[2], Alejandra Villalobos[3], Roy Sibaja[4], Esteban Vega[5], Luisa Chavarria[6], Mabel Granados[6], Gabriel Ibarra[7]

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The following study attempts to describe environmental determinants in the cantons of Alvarado and Central Cartago in Costa Rica which were examined at the individual level (microenvironmental), the community level (macroenvironmental) and community participation in the environment. A pilot-test was assessed to determine survey validation, followed with the application of the survey to a total of 50 participants selected in a non-probability form from the district of El Molino and Pacayas. Frequencies were obtained for each environmental determinant which assessed academic level, socioeconomic status, knowledge of regulatory environmental policies, health status, and community participation. Results revealed differences in the frequencies of each macro and micro determinant between the two districts showing that Pacayas had higher frequencies than El Molino. Community participation was found to be higher in Pacayas; also the knowledge for the correct disposal of trash was higher in Pacayas. This study serves as a basis for prospective research that seeks to implement environmental preventive strategies and policies that focus on enhancing community participation in environmental management, specifically in these regions.

Funding Source: NIH

Recommended Citation:
Guerra , Jasmine ; Gonzalez , Melissa ; Villalobos , Alejandra ; Sibaja , Roy ; Vega , Esteban ; Chavarria , Luisa ; Granados , Mabel ; Ibarra , Gabriel . "Environmental determinants and community participation in the population of the Canton of Alvarado and the Central Canton of Cartago" (2014). COURI Symposium Abstracts, Spring 2014, ID= 310

The role of insulin in enhanced vulnerability to nicotine use in diabetic rats

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Patients suffering from metabolic disorders, such as diabetes display greater vulnerability to tobacco use. It is unclear if they experience greater rewarding effects of nicotine due to alterations in insulin signaling. So, we conducted a series of studies comparing the rewarding effects of nicotine in diabetic and healthy control rats using conditioned place preference (CPP) procedures. Separate groups of rats received a systemic injection of streptozotocin (STZ). STZ is toxic to insulin-producing cells in the pancreas and increases glucose levels to approximately 500 mg/dl. Fourteen days after, all rats were tested for their initial preference for two distinct compartments of our conditioning apparatus. Five days later, the rats received an injection of saline or nicotine (0.1, 0.2, 0.4, 0.6, and 0.8 mg/kg, s.c.) and were confined to their initially non-preferred side. On intervening days, they received saline and were placed into the alternate side. After eight days of conditioning, the rats were re-tested for shifts in preference. In a follow up study, the same experimental procedures were used; however, on the day animals received STZ they also were implanted with an insulin pellet. The results revealed that diabetic rats displayed a larger shift in preference to the nicotine-paired compartment as compared to controls. The latter effect was reduced in diabetic rats that received insulin replacement. Our results suggest that the rewarding effects of nicotine are enhanced in diabetic rats. Also, insulin appears to play a role in modulating the strong rewarding effects of nicotine that vulnerability to tobacco use.

Funding Source: NIDA, American Diabetes Association

Recommended Citation:
Hinojosa , Cecilia ; Pipkin , Joesph ; Flores , Rodolfo ; Tejeda , Christian ; O'Dell , Laura . "The role of insulin in enhanced vulnerability to nicotine use in diabetic rats" (2014). COURI Symposium Abstracts, Spring 2014, ID= 295

Regulation of pediatric T-cell acute lymphocytic leukemia cells in the invasion of the central nervous system

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Pediatric T-cell acute lymphoblastic leukemia (T-ALL) can develop from uncontrolled growth of lymphoblastic T cells and accumulation of leukemic cells inside the mediastinal lymph node. Presently, the 5-year survival rate for pediatric T-ALL patients is approximately sixty five percent. T-ALL cells can cross the blood-brain barrier and enter the central nervous system (CNS), which complicates the treatment of T-ALL, since systemic chemotherapies do not reach the CNS. As a result, when these therapies are stopped T-ALL cells that entered the CNS are able to re-enter the circulation and kill the patient. Currently, intrathecal chemotherapies are used to attempt to kill cells that enter the CNS, but these therapies can cause brain damage and tumors in children that survive. Thus, we have been working to develop therapies that can block migration of T-ALL into the CNS. In a humanized mouse model of T-ALL, the binding of C-C chemokine receptor 7 (CCR7) with its ligand, CCL19, is both necessary and sufficient for T-ALL cells to migrate into the CNS. Our research will develop Transcription Activator-Like Effector Nucleases (TALENS) to delete the CCR7 locus and block CCR7-directed migration of T-ALL cells across an endothelial cell monolayer and into the CNS of mice. Notably, our studies may serve as a new adjuvant therapy for children with T-ALL who currently face being exposed to intrathecal chemotherapies, which have potentially life-long adverse effects.

Recommended Citation:
Hinojoza , Brenda ; Katz , Moshe ; Vines , Charlotte . "Regulation of pediatric T-cell acute lymphocytic leukemia cells in the invasion of the central nervous system" (2014). COURI Symposium Abstracts, Spring 2014, ID= 351

UTEP-1, a UTEP derived human cancer cell explant obtained from the tumor of a patient from the El Paso area

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In order to advance our understanding of the biology of tumors that affect El Pasoans, it is essential that we develop tissue culture models that reflect the tumors that develop in the local population. We report the first successful culturing of UTEP-1 a cancer cell culture derived from a breast tumor from a local patient. A fresh tumor sample was obtained at 11.30am on Feb 6th, 2014, four hours after the patient was admitted into the surgical theater for a double mastectomy. The resected tissue was first transported to the Del Sol Pathology/Solaris laboratories, where a small (5gram) tumor fragment was removed and placed in a 50 ml falcon tube containing RPMI media and antibiotics. The sample was then transported to the Cell Core Facility at UTEP, where mechanical and enzymatic digestion protocols were used to release single cell suspensions from the tumor mass. The resulting cell population was placed in a tissue culture dish with RPMI plus 10% serum and antibiotics. In the subsequent two weeks we observed primarily fibroblast-like cell outgrowth, which was followed by emergence of an epithelial-like population which we have termed UTEP-1. Ongoing characterization of UTEP-1 cells will provide us with a defined human breast culture – the first one isolated at UTEP from the tumor of a patient in the El Paso area.

Recommended Citation:
Lerma , Natzidielly ; Parra , Karla ; Valenzuela , Paloma ; Vidal , Chantal ; Gallegos , Alejandra ; Varela , Armando ; Zepeda , Hector ; Francia , Giulio ; Aguilera , Renato . "UTEP-1, a UTEP derived human cancer cell explant obtained from the tumor of a patient from the El Paso area" (2014). COURI Symposium Abstracts, Spring 2014, ID= 361

Citizenship, ethnicity and environmental justice: pinpointing the social vulnerabilities of Hispanic immigrants

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Research suggests that in the US, some social groups experience greater risk exposure and less ability to recover from environmental disasters than others. Stemming from a lack of social power, vulnerability to natural disasters such as flooding may strain groups like Hispanic immigrants more than those who are US born, suggesting that causes of these disasters are more than "natural." Hispanic immigrants in the US are marginalized in that they lack access to state resources, are generally of relatively low socioeconomic status, and often experience language barriers. As a result, this group experiences heightened barriers in preparing for and recovering from disaster. To examine social inequalities in the disaster preparedness, risk and recovery, this study compares the experiences of Hispanic immigrants with other social groups living in areas at high risk to flooding. Based on 39 in-depth phone interviews conducted with immigrants and US-born individuals who live within 100-year and 500-year flood zones in Miami (FL) and Houston (TX), the study seeks to distinguish particular factors that amplify social vulnerability for Hispanic immigrants. Results reveal that Hispanic immigrants experience specific constraints that that exacerbate their vulnerability. These include language-related informational deficits about their exposure to flood risks, evacuation and the availability recovery assistance; reduced access to flood insurance due to low incomes and home-renter status; and, for home-renters, exploitative tenant-landlord relationships that inhibit their abilities to recover from flood damage.

Funding Source: National Science Foundation

Recommended Citation:
Maldonado , Alejandra ; Collins , Timothy ; Grineski , Sara . "Citizenship, ethnicity and environmental justice: pinpointing the social vulnerabilities of Hispanic immigrants" (2014). COURI Symposium Abstracts, Spring 2014, ID= 392

Dopamine D2 receptor plays a key role in sleep and circadian activity

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Sleep is critical in maintaining body homeostasis and its disruption affects many physiological and behavioral processes. Furthermore, abnormal sleep patterns are typically observed in people with neuropsychiatric disorders including autism and depression. Interestingly, those disorders are associated with anomalous dopamine systems. Dopamine is a major neuromodulator in humans and other species including flies. In this study, we utilize the fruit fly, Drosophila Melanogaster, as a model system to examine whether and how dopamine and its receptors are involved in sleep and circadian activity. The sleep and circadian activity were measured with the Drosophila Activity Monitor (DAM) system. Immunohistochemical studies were also performed on the dissected brain to visualize dopamine receptor expression. We have found that deficient dD2R (D2 dopamine receptor) or overexpressed dD2R in the mushroom bodies (MB), a brain structure critical for learning and memory, causes morphological and behavioral phenotypes. We are currently analyzing the phenotypes in detail and investigating how different factors such as social isolation or interaction affect the morphological and circadian phenotypes in wild type and dD2R mutants. This work is supported by the RISE program.

Recommended Citation:
Mercado , Ivan ; Sabandal , Paul ; Han , Kyung-An . "Dopamine D2 receptor plays a key role in sleep and circadian activity" (2014). COURI Symposium Abstracts, Spring 2014, ID= 381

Establishment of a fresh human tumor bank at UTEP

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There are no readily available human cancer primary cultures isolated from Hispanic patients, and it is imperative that such a cell bank be developed. Such a resource may help to alleviate some of the health disparities affecting this minority group. We describe the process by which we have begun to assemble a fresh tumor tissue bank. A collaboration was set up between UTEP and the Solaris pathology lab in El Paso. Next, IRB approval was obtained from UTEP, together with a drafting of patient consent forms in English and Spanish. Subsequently, tissue fragments released from the pathology lab are delivered to UTEP in growth media and on ice in under 1 hour. The fragments are cut into 4 fragments, one of which is immediately frozen down in 10% DMSO. A second fragment is enzymatically digested and then implanted into recipient female immunodeficient mice for in vivo propagation. The third fragment is mechanically dispersed, and the fourth fragment is enzymatically digested – and each resulting cell population is then plated in tissue culture. Using this protocol we have now obtained three human tumor samples – one from a prostate cancer patient from Toronto (Canada; to be used as an external control), and two samples from two patients in the El Paso area. These local samples are from a primary breast tumor and from a mucinous adenocarcinoma of unknown tissue origin. These results provide proof-of-concept for the development of a tumor library at UTEP that includes samples derived from local Hispanic patients.

Recommended Citation:
Miramontes , Irving ; Parra , Karla ; Valenzuela , Paloma ; Jallad , Sarah ; Emmenegger , Urban ; Thordarson , Gudmundur ; Zepeda , Hector ; Aguilera , Renato ; Francia , Giulio . "Establishment of a fresh human tumor bank at UTEP" (2014). COURI Symposium Abstracts, Spring 2014, ID= 342

An in vitro system to analyze NKT cell-mediated suppression of inflammatory cytokine production following F. Tularensis infection

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Francisella Tularensis is a highly infectious aerosol transmissible pathogen that has been identified as a possible bioweapon. Therein lies the importance of determining the pathogen's mechanism of virulence and possible novel treatments. Previous research suggests that excessive inflammation in response to F. tularensis as potential cause of death of infected organisms. NKT cells are a subset of white blood cells with both pro-inflammatory and regulatory functions that could potentially control this lethal response. Indeed, Dr. Spencer has shown that NKT cell-deficient mice are less likely to survive infection by F. tularensis compared with NKT cell-sufficient controls. We hypothesize, therefore, that NKT cells act to suppress the host immune response and reduce the risk of death. In order to address the mechanism by which NKT cells mediate this suppression, we developed an in vitro assay to isolate NKT cells and infected macrophages. This assay will then allow manipulations of NKT cells to neutralize the suppressive effector function. These optimal in vitro culture conditions resulted in a reduction of IL-6 production from infected macrophages in the presence of NKT cells. Finally, addition of neutralizing antibodies will allow us to block specific NKT cell effector functions in an attempt to reverse the suppression of IL-6 production. These results will be confirmed in vivo with knockout mice. Potential drugs designed to elicit these same effector molecules could provide a potential therapeutic for this infection.

Funding Source: Campus Office of Undergraduate Research Initiatives

Recommended Citation:
Molina-Limon , Noel ; Setzu , Nicole ; Ramos , Mireya ; Spencer , Charles . "An in vitro system to analyze NKT cell-mediated suppression of inflammatory cytokine production following F. Tularensis infection" (2014). COURI Symposium Abstracts, Spring 2014, ID= 359

The punishment you deserve: how a deity and the situation influence your decisions.

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This study investigated the effects of positive and negative religious priming, and proximal or distal threat on the desire to punish others. Data was collected online. Participants were primed with either an angry or benevolent deity through the selection of Biblical passages that encouraged forgiveness or punishment for the prime conditions. They were then given a short vignette that discussed a crime that was either an immediate (proximal) or distal threat to public safety. As a post-task, a Likert-type scale was used to determine the willingness to punish others. A total of 130 students of the University of Texas in El Paso participated in the experiment. These data shows that there is a significant main effect for the prime and threat conditions. There is a significant effect for prime in that those in the 'angry deity' condition were more willing to punish transgressors. Further, those participants in the proximal threat condition were more willing to punish a person than were those participants in the distal threat condition. Future directions and implications will be discussed.

Recommended Citation:
Moran , Roberto ; Smith , Brandt ; Zárate , Michael . "The punishment you deserve: how a deity and the situation influence your decisions. " (2014). COURI Symposium Abstracts, Spring 2014, ID= 412

Self-respect and its importance to Rawls' theory of justice

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In *A Theory of Justice*, John Rawls attempts to provide the guiding principles for institutions to follow in order to create a just society. Rawls assumes that any individual wants and needs social primary goods in order to carry out their plans of life. Self-respect (self-esteem) is among many of the primary goods Rawls described as necessary for individuals. In this essay I examine how Rawls' notion of self-respect plays an important role in the selection of the two principles.

Recommended Citation:
Murillo , Sharon ; Arruda , Caroline . "Self-respect and its importance to Rawls' theory of justice" (2014). COURI Symposium Abstracts, Spring 2014, ID= 298

A potential alternative therapy for influenza

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Influenza A virus causes worldwide seasonal epidemics, leading to the deaths of up to 500,000 people a year around the world. Therapeutics currently used to combat Influenza have drawbacks; vaccinations rely on prediction and antivirals can be rendered ineffective by single point mutations in the viral genome. Our previous studies on the interaction between the Influenza A virus and the Small Ubiquitin-like MOdifier (SUMO) identified the nonstructural protein NS1 as a true target for SUMOylation. The SUMOylation of NS1 has been shown to regulate its functions, including its ability to disrupt the interferon (IFN) signaling pathway. Our lab has previously shown that non-SUMOylatable forms of NS1 are substantially impaired in their IFN-neautralizing ability. Increased SUMOylation of NS1 has a similar although less dramatic effect. Here, we explore the potential use of an NS1-specific artificial SUMO ligase (ASL), capable of enhancing NS1 SUMOylation 4 fold, as an alternative therapeutic for Influenza A infections. Initial tests aimed at standardizing the conditions for delivery of the protein have found an effective method to deliver the ASL into MDCK cells. The transfected ASL was found within MDCK cells for 24 hours and did not appear to affect cell viability, indicating that this method of delivery into the cell could be used to test whether NS1 hyper-SUMOylation affects viral replication. Our ongoing studies will determine whether the NS1-specific ASL could be used as a potential therapeutic effective against a broad range of Influenza A strains.

Funding Source: NSF, NIH

Evaluating the effectiveness of a drinking-water treatment plant in removing intestinal parasites

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Diseases caused by fecal contamination in water are a worldwide problem, and millions of people can be affected every year. Though fecal contamination can pollute water with bacteria, viruses, and parasites, the analysis of water potability only considers bacterial parameters. Also, immunomagnetic separation and immunofluorescence, the current standard methods of detection, are very expensive and rarely used. This study evaluates the effectiveness of a drinking-water treatment plant in removing intestinal parasites. To estimate the concentration of parasites in a given sample, different methods of detection were applied, including the standard methods of immunomagnetic separation and immunofluorescence, as well the more economical alternative; light microscopy. Parasite concentrations were compared amongst each other in order to evaluate the level of contamination of the plant's water source, the water after each step in the plant's decontamination process, and finally, the water exiting the plant. The results suggest that the drinking-water plant reduced the concentration of parasites, but did not completely eliminate them. After comparing the methods of detection, the results suggest that immunomagnetic separation and immunofluorescence are together the most sensitive at detecting parasites. Other methods of light microscopy, however, can still detect potentially harmful parasites that could not be detected using the standard methods alone.

Funding Source: Grant # 5T37MD001376-06-National Institute on Minority Health & Health Disparities (NIMHD)

Recommended Citation:
Parra , Ricardo ; Solano , Melissa . "Evaluating the effectiveness of a drinking-water treatment plant in removing intestinal parasites" (2014). COURI Symposium Abstracts, Spring 2014, ID= 338

Young El Paso women's contraceptive knowledge, use and access

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Family planning is of crucial importance when it comes to women and the level of economic and academic success they are able to achieve. Along with the low levels of knowledge on contraception that have been associated with Hispanics they are also faced with other barriers to birth control and sex education. El Paso's demographics make this location an ideal place to conduct research on contraceptive knowledge, use and access. The first phase in this study was completed in the Fall 2013 semester where 20 female, UTEP undergraduates were interviewed. The median age for these participants was 19 with a high percentage classified as freshman. About half were originally from Mexico and more than half have attested to residing with their parents. Preliminary analysis of the qualitative data show that parents, siblings, and friends influence these women's views on contraception and sexual behavior. Themes from this data will be used to create a quantitative survey, to be given to 300 young women at UTEP, eventually leading to a better understanding of the complexities influencing the relationship between contraception and Hispanic women.

Recommended Citation:
Pena , Miren ; Leyser-Whalen , Ophra . "Young El Paso women's contraceptive knowledge, use and access" (2014). COURI Symposium Abstracts, Spring 2014, ID= 388

Chemoarchitecture of the mammalian hypothalamus: mapping of three peptidergic neuronal populations (a-MSH, nNOS, and MCH) in the lateral hypothalamic area and surrounding regions

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While the hypothalamus is a major and extensively studied homeostatic control center, precise circuitry underlying much of its functionality remains undescribed. The lateral hypothalamic area (LHA) is a chemically and functionally diverse region of the hypothalamus, and an important node in networks controlling ingestion, reproduction, aggression, and sleep/wake cycles. However, the functional circuitry of the LHA remains imprecisely understood. Using histological analyses, immunohistochemistry, wide-field multi-fluorescent imaging, and atlas-mapping techniques, we have analyzed the distribution of three molecules having established roles in appetite and fluid balance, a-melanocyte stimulating hormone (-MSH), melanin-concentrating hormone (MCH), and neuronal nitric oxide synthase (nNOS). Our data indicate that -MSH fibers avoid the LHA, while nNOS and MCH cell bodies and fibers are dispersed throughout in a heterogeneous, patterned manner. There is a subpopulation of cells expressing nNOS and MCH in the dorsolateral LHA. Apart from the LHA, nNOS cell bodies and fibers are found in the supraoptic (SO) and paraventricular (PVH) nuclei, the ventromedial (VMH) and posterior hypothalamus (PH), the periaqueductal gray, supramammillary and premammillary nuclei, the zona incerta (ZI), and the median eminence (ME). -MSH fibers traverse the SON, PVH, DMH, PH, tuberomammillary nucleus (TM), ME, and arcuate hypothalamus (ARH); cell bodies are in the ARH. MCH fibers and cell bodies are found in the ME, ZI, PH, MM, and DMH. This work marks the first time that the anatomical distributions of -MSH, MCH, and nNOS have been studied together in the hypothalamus with such detail, and will aid in functional studies of this region.

Funding Source: NSF

Inequality in cervical cancer incidence in Costa Rica: 1999-2008

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Despite a worldwide decrease in cervical cancer incidence women continue to be afflicted by this disease. The purpose of this study was to determine the extent of inequality among Costa Rican women and elucidate the factors associated with the likelihood of developing cervical cancer. This investigation was a descriptive retrospective population based study that described cervical cancer incidence at the district level from 1999-2008. Cervical cancer incidence was studied from the perspective of the social determinants of health. The Theil index was used to quantify inequality in cervical cancer incidence at the district level. Using the Theil index it was determined that during the first five-year period (1999-2003) inequality reached a value of 9.08 on a range of [0.00-16.10]. In the second five-year period (2004-2008) it reached a value of 9.13 on a range of [0.00-16.18]. Inequality remained relatively constant and high. Our preliminary results of geographically weighted regression models indicate that after controlling for socioeconomic variables and geographic access to health care, cervical cancer incidence remained significantly high in some areas. The areas farthest away from the center of the country, especially bordering areas experienced the highest levels of incidence. The results of this study will help in understanding the inequalities involved in cervical cancer incidence and provide statistical data for implementing measures to improve the quality of life of women.

Funding Source: National Institutes of Health

Recommended Citation:
Preza , Elizabeth ; Santamaría-Ulloa , Carolina . "Inequality in cervical cancer incidence in Costa Rica: 1999-2008" (2014). COURI Symposium Abstracts, Spring 2014, ID= 321

Chronic stress decrease mitochondrial content in rat skeletal muscle

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A reduced mitochondrial content and/or function have been shown to be associated with insulin resistance. Environment with chronic stress have been shown to predispose one to develop insulin resistance. However, the effect of stress on skeletal muscle mitochondrial content and substrate concentration, such as glycogen, is not clear.

Wistar rats were either repeatedly restrained (30min/d x 14d; n=6) and exposed in the rat's home cage, or maintained as unstressed controls (n=7). All animals were harvested on day 14. Gastrocnemius muscle tissue was fresh frozen and used to measure mitochondrial content (OXPHOS proteins; complex I-V) by western immunoblotting. Tissue was also mounted, cryosectioned and stained for glycogen content using Periodic acid-Schiff staining. Glycogen content was measured in muscle with predominantly type-I, type-II, and mixed muscle fibers.

Mitochondrial content was significantly lower in stressed animals compared to control (control vs. stressed, AU: Complex-I (0.89 0.18 vs. 0.35 0.05), Complex-II (0.36 0.09 vs. 0.07 0.01) Complex-III (0.1 0.02 vs. 0.1 0.01) Complex-IV (0.22 0.08 vs. 0.01 0.01) Complex-V (0.33 0.09 vs. 0.06 0.01); all $p<0.05$). Glycogen content was not different between control and stressed animals (control vs. stressed, AU: type-I 0.0082 0.0003 vs. 0.0079 0.0002, $p=0.39$; type-II 0.0093 0.0001 vs. 0.0096 0.0002, $p=0.75$; and mixed 0.008 0.001 vs. 0.008 0.001, $p=0.16$).

Exposure to chronic stress resulted in a reduced mitochondrial content in skeletal muscle. Future studies should investigate whether stress-induced reduction in mitochondrial content leads to compromised lipid oxidation capacity and insulin resistance in skeletal muscle.

Recommended Citation:
Rodriguez , Ricardo ; Valverde , Luisa ; Beltran , Seth ; Walker , Ellen ; Varela , Armando ; Khan , Arshad ; Gosselink , Kristin ; Bajpeyi , Sudip . "Chronic stress decrease mitochondrial content in rat skeletal muscle" (2014). COURI Symposium Abstracts, Spring 2014, ID= 409

Autism spectrum disorder awareness

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There recently has been a steady increase in the prevalence of documented cases of Autism Spectrum Disorder (ASD). A large proportion of special education service referrals for school-age children suspected of having ASD come from the General Education classroom teacher. For this reason, it is important that pre-service teachers gain accurate and up-to-date awareness of early signs and symptoms of students that may fall under that ASD category. This research takes a look at the overall awareness that students at the University of Texas at El Paso have of the disability category, Autism Spectrum Disorder. By use of a pencil and paper survey, this study was conducted to find a better understanding of the current knowledge that General Education and Special Education pre-service teachers possess about ASD using comparative data across colleges. Two student groups were targeted in this study to determine their level of understanding of true symptoms of ASD: those who have received training in diagnostic criteria, such as Education majors, and those who have not received any training. Preliminary results are expected to confirm the hypothesis that ASD symptom awareness may not be well developed generally among college students. We also expect to find that ASD symptoms may be confused with symptoms of other behavior disorders among pre-service teachers. If results are as expected then more training is required in the college of education concerning the diagnostic criteria of ASD needed to make an accurate referral.

Funding Source: Campus Office of Undergraduate Research Initiatives

Recommended Citation:
Sepulveda , Nicole ; Upreti , Gita ; Trussell , Robert . "Autism spectrum disorder awareness" (2014). COURI Symposium Abstracts, Spring 2014, ID= 402

The situation of the elderly population of the Guido de Desamparados in San Jose, Costa Rica

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The population of the country of Costa Rica is going through structural change and expected to increase by the year 2025 at a rate of 6.6% to 11.5%. On the other hand, life expectancy will increase to 79.2 years for men and 84.9 years for women. The objective of this study is to analyze and understand the comprehensive health status of the 25 elderly in the Guido de Desamparados in San Jose, Costa Rica by looking at the biological, psychosocial and educational perspectives in order to establish healthy aging and the consequence related to quality of life. This study used a mixed qualitative and quantitative design covering 11 different components, of which two of them are quantitative (biochemical and physiological), six are mixed (nutrition, biomechanics, microbiology, gerontology, dentistry and pharmacy) and three are qualitative (Social, nursing and educational and social participation). For the purpose of this abstract, only one component was used. Results showed under the psychosocial perspective that religion plays an important role in the lives of older adults. Furthermore, it illustrated that religion helps this sample population to have a greater acceptance of approaching death.

Funding Source: Grant Number 5T37MD001376-06 from the National Institute on Minority Health & Health Disparities

Recommended Citation:
Sigala , Viridiana ; Ibarra-Mejia , Gabriel . "The situation of the elderly population of the Guido de Desamparados in San Jose, Costa Rica" (2014). COURI Symposium Abstracts, Spring 2014, ID= 377

Racial/ethnic identities and the success of Hispanic students at a Hispanic serving institution

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Designated as a Hispanic Serving Institution (HSI), The University of Texas at El Paso (UTEP) is situated on the U.S./Mexico border and provides access to higher education for the residents of the Paso Del Norte region. With this designation in mind, previous research regarding education among minorities has shown that African American males attending Historically Black Colleges and Universities (HBCUs), tend to be more successful compared to those attending predominantly white institutions. However, little research exists on Latinos in Hispanic Serving Institutions. In order to address this gap in the literature, this research is centered on Hispanics/Latinos and how their experiences are shaped with regards to their ethnic identities, at a Hispanic Serving Institution. This project examines how the intersections of race/ethnicity, gender, and sexuality, shape Hispanic/Latino student's overall experience in higher education. Through a series of semi-structured interviews with current UTEP students, findings show that students attending UTEP agree that being Hispanic in a predominantly Hispanic space has helped them feel a sense of solidarity amongst each other and that this has helped them to be more fulfilled in their college experience. While students feel that overall they are afforded more opportunities at UTEP; in terms of gender, students claim that the environment is less than ideal. In this research, success is not equated to graduation rates and post graduate attendance but to how current students feel that UTEP has provided them with a place where they've had more opportunities than they might not have received at a non-HSI.

Recommended Citation:
Silva , Angela ; Murga , Aurelia . "Racial/ethnic identities and the success of Hispanic students at a Hispanic serving institution" (2014). COURI Symposium Abstracts, Spring 2014, ID= 379

Role of the 2-on-2 hemoglobin HbN for infectivity and persistence of Mycobacterium tuberculosis

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Mycobacterium tuberculosis (Mtb), the causative agent of human tuberculosis (TB), infects approximately ten million people and causes about two million deaths worldwide annually. Mtb's success as an intracellular pathogen results in its ability to survive within the hazardous environment of macrophages and establish long-term and persistent infection. The virulent strains, Mtb and Mycobacterium bovis, and the attenuated strain, M. bovis BCG (BCG) express two genes, glbN and glbO, coding distantly related 2-on-2 hemoglobins (2/2 Hbs), HbN and HbO, respectively. Although both recombinant proteins possess similar and high affinity for O2, we observed that the NO· -dioxygenase of HbN was approximately 1,000 times higher than that of HbO, suggesting that HbN, and not HbO, can protect the bacterium from inhibition by macrophage-generated NO· . Indeed, the disruption of glbN in BCG caused a dramatic reduction in the NO· -consuming activity of stationary phase cells. Aerobic respiration of knockout BCG cells was inhibited markedly by NO· in comparison to that of wild-type BCG cells. Although the latter observations indicated a protective role for HbN in cultured BCG cells, a similar function remains to be demonstrated in Mtb cells in vitro and during the course of macrophage infection. Here, we report the successful inactivation of glbN by allelic replacement in the virulent Mtb strains, CDC1551 and H37Rv. Characterization of the knockout strains are on-going. Grant Support (HO): NCRR (5G12RR008124) and NIMHHD (8G12MD007592) from NIH. VE and JV are supported by the STEM/SMARTS (NSF) and RISE (NIH) programs, respectively.

Funding Source: NCRR (5G12RR008124) , NIMHHD (8G12MD007592)

Recommended Citation:
Vazquez-Perez , Jonathan ; Escalante , Veronica ; Ouellet , Hugues . "Role of the 2-on-2 hemoglobin HbN for infectivity and persistence of Mycobacterium tuberculosis" (2014). COURI Symposium Abstracts, Spring 2014, ID= 411

Effects of vibration training on reducing risk of falls among Hispanic older adults

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Falls are a serious problem facing older adults. Hispanic elderly suffer the highest incidence of fall-related injuries. Recently, controlled whole-body vibration (CWBV) training has emerged as a new modality to reduce older adults' fall risk. However, the effect of the CWBV upon reducing the fall risk among Hispanic seniors still remains unknown. The primary purpose of this study was to examine to what extent a 6-week CWBV training reduces the fall risk among Hispanic older adults. Six Hispanic healthy older adults (65 y/o) participated in this study. All subjects underwent the CWBV training (10 minutes a day, 3 days a week for 6 weeks) on a vibrator platform. Their risk of falls, quantified by muscle strength, body balance, and functional mobility were assessed before (baseline) and after (post-training) the training. Paired-*t* tests were used to compare the risk of falls between baseline and post-training test. After the training, all risk factors of falls were significantly improved. Specifically, the maximal isometric knee-extensor strength increased (12 2%) from baseline to post-training test (p<0.001). The Berg balance test score was improved by 6 2 points (p<0.001). A decrease of 11 4s in the time to perform the Timed-Up-And-Go test was observed post training in comparison with baseline (p<0.01). Preliminary results indicate that a fast and easy 6-week CWBV training could improve the risk of falls among Hispanic older adults. More studies with larger sample size and a controlled group are needed to systematically assess the impact of such training.

Recommended Citation:
Villa , Chelsea ; Yang , Feng . "Effects of vibration training on reducing risk of falls among Hispanic older adults" (2014). COURI Symposium Abstracts, Spring 2014, ID= 380

Layali Al-Sham: Contextualizing bi-musicality in cultural exchange programs

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The process of investigating a foreign musical practice may also enable the preservation and transmittance of the art. But in order to accurately represent another musical culture, one must become “bi-musical” [1]. This means being able to function within the foreign music as someone native to the practice would [2]. Through my involvement in Arabic music research and performance with UTEP’s Arabic music ensemble, Layali Al-Sham, I have achieved an understanding of Arabic music as both an art and practice through an authentic musical experience.

Understanding the manners of classical Arabic music practice in order to become bi-musical is challenging as it can be considered a fading tradition throughout the Middle East. Unfortunately, the pervasiveness of Western popular music has deprived many of the younger Arab generations from being exposed to classical Arabic musical traditions. However, a handful of researchers strive to preserve and transmit classical Arabic musical practice. This project focuses on the research and performance of authentic Arabic music as a means to increase our understanding of Arab culture and to increase the community’s empathy and tolerance for the Arab people via a culture form to which most people can relate: music. This project demonstrates the ways that becoming bi-musical (via research and performance) has allowed Layali Al-Sham to increase cultural awareness and empathy amongst participating musicians and audiences.

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[1] Hood, Mantle. "The Challenge of "Bi-Musicality"."*University of Illinois Press on behalf of Society for Ethnomusicology* 4.2 (1960): pg. 55. *JSTOR*. Database. 22 Jul 2013. <http://www.jstor.org/stable/924263>.

[2] Ibid.

Funding Source: COURI (Campus Office of Undergraduate Research Initiatives)

Recommended Citation:
Yapor , Leslie ; Shaheen , Andrea . "Layali Al-Sham: Contextualizing bi-musicality in cultural exchange programs" (2014). COURI Symposium Abstracts, Spring 2014, ID= 414

Chemistry & Biochemistry

Effects of n-terminal acetylation on the pore formation of Mycobacterium tuberculosis ESAT-6 protein

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Mycobacterium tuberculosis (Mtb), the causative agent for tuberculosis in humans, is present as a latent state in approximately one third of the world's population. Mtb has become more resilient over the years through development of multi-drug resistance. The only vaccine, mycobacterium bovis bacillus Calmette-Guerin (BCG), has shown to be ineffective after 10 years of initial vaccination. Recently, it has been discovered that 6kD early secretory antigenic target (ESAT-6) and 10kD culture filtrate protein (CFP-10), are important for Mtb virulence. As demonstrated by Dr. Sun's laboratory and others, ESAT-6 has a potent membrane lysing ability. Furthermore, ESAT-6 and CFP-10 have been shown to be secreted as heterodimers with little being known about how they, together, interact with cell membranes. The acetylation of threonine 2 on ESAT-6 is suspected to be essential for the disassociation between ESAT-6 and CFP-10, which is required for interaction with the membranes. In this study, the heterodimer was expressed and purified. Using site directed mutagenesis, the acetylation-mimic residues alanine and glutamine were used to replace threonine 2, while arginine was used as a non-acetylation negative control. The effects were then tested by using the dye/quencher pair, 8-aminonaphthalene-1,3,6 trisulfonic acid (ANTS) and p-xylene-bis-pyridinium bromide (DPX). Fluorescence was then measured upon pore formation in liposome membranes as ANTS and DPX were de-quenched. Our preliminary studies demonstrated that mutants with glutamine, arginine and alanine induced half of the pore formation relative to the wild type. More studies are needed to confirm the changes in pore formation by the mutants.

Funding Source: NIH-NIGMS GM095475

Synthesis and characterization of new Fe and Cu nanoparticle hydrogels

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Research in transition metal nanoparticles has gathered momentum lately due to the numerous applications in a variety of fields, such as biomedical sciences, where they can serve as catalysts, sensors, drug-delivery systems. They also find use in environmental remediation and separation science. Due to the newly established health-risks that nanoparticles pose, there is a need to develop new systems that make use of their extraordinary functions, yet anchor them within porous materials that encapsulate them and prevent their leakage into the environment. In this project, we developed hydrogels that contain Fe-nanoparticles and Cu-nanoparticles trapped within their interstitial environments. The gels were produced by combining the corresponding transition metal (II) nitrate with acrylic acid, tetraethyleneglycol diacrylate, and a free-radical initiator and allowed to thermopolymerize in methanol. Sodium borohydride reduction of the soluble product resulted in a colored hydrogel. The characterization of the transition metal hydrogels with Transition Electron Microscopy, Scanning Electron Microscopy, and Electron Paramagnetic Spectroscopy will be presented.

Recommended Citation:
Algara , Miguel ; Molugu , Sudheer ; Noveron , Juan . "Synthesis and characterization of new Fe and Cu nanoparticle hydrogels" (2014). COURI Symposium Abstracts, Spring 2014, ID= 327

Expression of an early gene product of the avian adenovirus CELO for structural and functional studies

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In order to ensure their replication and survival, viruses must control host machinery responsible for transcription. One mechanism affecting transcription is the post-translational modification pathway termed SUMOylation, in which Small Ubiquitin like Modifier (SUMO) proteins are attached to target proteins with the purpose of altering their final function. The avian adenovirus Chicken Embryo Lethal Orphan (CELO) comprises an effector protein known as Gam1 that inhibits SUMOylation of the host cell. Gam1 effectively enables the virus to control the host cell for its own replication. However, the detailed mechanism by which Gam1 does so has yet to be elucidated. The long-term objective to crystallize Gam1 and proceed with determination of its three-dimensional atomic structure will shed light on the mechanism by which Gam1 performs its function. Gam1 was cloned into a bacterial expression system containing a fused bacterial chaperone protein tag called Trigger Factor to aid protein folding and a fused 6x histidine tag utilized for affinity purification. Further purification using size exclusion chromatography coupled with Dynamic Light Scattering measurements has suggested that current protein expression methods have yielded Gam1 protein at the monomeric size. This suggests that properly folded protein has been obtained. Gam1 is now suitable to conduct *in vitro* functional assays, and in addition, further purification using ion exchange chromatography will generate high purity protein to begin initial crystallization screenings. Results obtained will pave the way for future structural determination of Gam1, which will provide a better understanding about its role in viral replication.

Recommended Citation:
Alvara , Christina ; Avila , Gustavo ; Xiao , Chuan . "Expression of an early gene product of the avian adenovirus CELO for structural and functional studies" (2014). COURI Symposium Abstracts, Spring 2014, ID= 332

Identification of G beta-gamma subunit interacting proteins in PC12 cells by mass spectrometry

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Beta-gamma (bg) subunit of G proteins has been shown to interact with microtubules (MTs) and play an important role in MT assembly and induction of neurite outgrowth. Furthermore, blocking Gbg-MT interaction disrupted MTs and induced neurite damage indicating the possible involvement of Gbg in neurodegeneration. Since neurodegeneration occurs in many neurological disorders including Parkinson's and Alzheimer's disease, it is of interest to identify Gbg-interacting proteins and the pathways involved in this process. To address this, we have initiated co-immunoprecipitation (co-IP) followed by proteomic analysis. Neurite outgrowth was studied using PC12 cells treated with NGF (nerve growth factor) for three consecutive days. Cell lysates as well as cytoskeletal fractions were isolated and subjected to co-IP using anti-Gb antibodies and Pierce co-IP kit. In this method anti-Gb antibodies were covalently coupled onto an amine-reactive resin yielding pure co-IP products (without contamination by the IP antibody) suitable for proteomic analysis. LC-MS/MS analysis of samples indicates that Gbg interacts with several proteins involved in neurite outgrowth or nervous system functions including the receptors for activated c kinase 1 (RACK1), MT motor protein dynein 1 heavy chain, clathrin heavy chain, and galectin-1 (Gal-1). Additional analysis is underway to elucidate how NGF influences these interactions in order to induce neurite outgrowth. Successful analysis will provide a model by which Gbg and its interacting proteins regulate neurite outgrowth and whether blocking these interactions induces neurodegeneration.

Funding Source: Research Inititiative for Scientific Enhancement (R.I.S.E.), UTEP BBRC

Recommended Citation:
Castanon , Amaris ; Almeida , Igor ; Roychowdhury , Sukla ; Arigi , Emma ; Sierra-Fonseca , Jorge ; Martinez , Jessica ; Carreon , Cynthia . "Identification of G beta-gamma subunit interacting proteins in PC12 cells by mass spectrometry" (2014). COURI Symposium Abstracts, Spring 2014, ID= 373

Synthesis of 1-palmitoyl-dihydroxyacetone phosphate and cloning of the alkyl-dihydroxyacetone phosphate synthase of Trypanosoma cruzi.

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Trypanosoma cruzi is a protozoan parasite that causes Chagas disease in humans, which affects 8-10 million people, mostly in Latin America. No fully effective drugs are known for the treatment of the chronic stage of the disease. A potential drug target is the enzyme alkyl-dihydroxyacetone phosphate synthase (ADS or alkyl-DHAP), which is involved in the synthesis of alkyl lipids abundantly found in *T. cruzi.* Here, we present data on the cloning of *T. cruzi* ADS (Tc-ADS) and synthesis of the substrate 1-palmitoyl-dihydroxyacetone phosphate. The substrate was synthesized by palmitoylation of dihydroxyacetone followed by phosphitylation with a dibenzylphosphoramidite, oxidation with *tert*-butylperoxide and then catalytic hydrogenation. The prepared materials are essential for the development of a bioassay for the identification of potential Tc-ADS inhibitors which may lead to new chemotherapeutics for Chagas disease.

Funding Source: NSF, NIH, COURI

Recommended Citation:
Castillo , Efrain ; Lopes , Felipe ; Cordero , Esteban ; Salloum , Nasim ; De Leon , Joaquin ; Almeida , Igor ; Michael , Katja . "Synthesis of 1-palmitoyl-dihydroxyacetone phosphate and cloning of the alkyl-dihydroxyacetone phosphate synthase of Trypanosoma cruzi." (2014). COURI Symposium Abstracts, Spring 2014, ID= 331

Bioinspired chromatin-analogues for making antibacterial plastics

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Chromatin DNA excretion by platelets is one of the first lines of autoimmune defense in sanguineum bacterial infection in the blood. The bacterial poly carbohydrate wall has strong affinity to DNA strands and thus chromatin binding to bacteria prevents it from aggregating and forming colonies that trigger their rapid growth. We are developing a DNA-polymer system that mimics the blood-born chromatin ability to bind bacteria and prevent its aggregation. The compound 11-acryloyloxy pyridinium bromide has an acrylate group that can photo polymerize upon UV-radiation or heat, and a pyridinium group that can bind DNA strands. This compound happens to have a hindering ability towards bacterial growth. When mixed with DNA strands, it binds and upon UV-radiation, it forms a DNA-polymer network. We prepared these copolymers with varying ratios of DNA:polymer in order to maximize DNA-solvent exposure so that bacteria could bind to the DNA strands. The bacterial-binding studies will be discussed in the presentation.

Recommended Citation:
Chaib , Eduardo ; Islam , Tarikul ; Dominguez , Delfina ; Noveron , Juan . "Bioinspired chromatin-analogues for making antibacterial plastics " (2014). COURI Symposium Abstracts, Spring 2014, ID= 334

Structural study of the circadian clock protein BMAL1

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Most organisms—from single-celled to humans—have an intrinsic clock that drives the daily physiological rhythms. This clock maintains synchronization between external environmental cues and internal biochemical events that ultimately ensures the organism uses energy and resources efficiently and effectively. In mammals, the CLOCK (Circadian Locomotor Output Cycles Kaput) and BMAL1 (Brain and Muscle ARNT-like 1) proteins serve as positive elements within the circadian loops that activate clock genes. BMAL1 is the only circadian gene without a known paralog, thus a single gene deletion or inactivation of BMAL1 leads to a complete loss of circadian rhythmicity. As an essential component in the circadian clock, BMAL1 plays a critical role in pathophysiological conditions including obesity and diabetes. The ultimate goal of the project is to determine the structure of BMAL1 via X-ray crystallography. Thus far, full length Bmal1 has been cloned and expressed in bacteria. However, protein purification attempts utilizing affinity and size-exclusion chromatography have shown that the recombinant BMAL1 is insoluble and not suitable for structural studies. Therefore, two alternative methods have been proposed. First, BMAL1 will be sub-cloned into small soluble domains based on available knowledge. Second, BMAL1 will be co-expressed with CLOCK to form a heterodimer, with the expectation that the dimer with be in its native form and soluble, facilitating structural determination of the complex. The structural determination of BMAL1 will enhance our understanding of the structure and function of circadian proteins and build a solid foundation for future biomedical endeavors of drug and therapeutic developments.

Recommended Citation:
Choi , Jennie ; Xiao , Chuan . "Structural study of the circadian clock protein BMAL1" (2014). COURI Symposium Abstracts, Spring 2014, ID= 365

The reduction in estrogen receptor-beta expression reduces growth rate of breast cancer cells in response to hormonal stimulation

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Much research has been carried out on the activity of estrogen (E2)/estrogen receptors (ERs) in the normal and cancerous breast, but the actions of E2/ERs and their interaction with other hormones, such as insulin-like growth factor-I (IGF-I) in the breast are not well understood. To study this, we have generated cell lines derived from the breast cancer cell lines MCF-7 and T47D, We used small interfering RNA (siRNA) to suppress the expression of the ER-beta. For this, we stably transfected the cells with plasmid carrying siRNA recognizing the ER-beta mRNA. Control cells were transfected with plasmid carrying inert siRNA. Western blots were used to verify the effectiveness of the transfection. Growth characteristics of the cells with low ER-beta expression were studied. Cells were cultured in DMEM/F12 medium with or without 1 M E2, 100 ng/ml IGF-I and 1 M of the anti-E2 ICI-182 780 (ICI). Cultures were continued for 6 days and total cell DNA measured for the assessment of total cell number. Reduction of ER-beta expression reduced growth rate of the MCF-7 cells in response to E2 stimulation but did not much affect IGF-I stimulation. Also, the inhibitory effects of ICI on cell growth were enhanced in the cells with low ER-beta expression. The effects on the T47D cells were less clear. Conclusions: ER-beta is important for E2-stimulated growth of breast cancer cells, but this E2 receptor does not interfere with the interaction between IGF-I and E2 in stimulating growth of breast cancers as does ER-alpha.

Recommended Citation:
Contreras , Lisett ; Herrera , Diana ; Lujan , Adrian ; Abu-Issa , Sarah ; Zambrano , Itzel ; Delgado , Juan ; Gabaldon , Cynthia ; Thordarson , Gudmundur . "The reduction in estrogen receptor-beta expression reduces growth rate of breast cancer cells in response to hormonal stimulation" (2014). COURI Symposium Abstracts, Spring 2014, ID= 333

Electronic communication in bimetallic compounds

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Oxidation-Reduction (redox) reactions are fundamental for various biological processes such as cellular respiration and decay of organisms. Electron transfer reactions have been studied using chemical models such as the Creutz-Taube complex. Dimers of bimetallic compounds have been used to study electron transfer as well due to the redox active nature of the bimetallic centers. The focus of this research is to synthesize analogs of the Creutz-Taube complex using diruthenium redox centers to study the electron transfer. Using two different redox active organic linkers, 2,5-Bis(methylamino)-1,4-benzoquinone and 2,5-dihydroxylbenzo-1,4-quinone, we created the bimetallic compounds. Each reaction with the $Ru_2(OAc)(DAniF)_3Cl$, DAniF = N,N' –di-m-anisylformamidinate, yielded bridged dimers where the Ru_2 units are bridged by the 2,5-Bis(methylamino)-1,4-benzoquinone and 2,5-dihydroxylbenzo-1,4-quinone respectively. Electrochemical techniques were used to measure and study the electron transfer of each synthesized dimer.

Recommended Citation:
Duran-Tobias , Benjamin ; Villagrán , Dino . "Electronic communication in bimetallic compounds" (2014). COURI Symposium Abstracts, Spring 2014, ID= 336

Cholesterol side-chain degradome of Mycobacterium tuberculosis

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Mycobacterium tuberculosis (*Mtb*) is an intracellular pathogen responsible for about 2 million deaths worldwide annually. During infection, *Mtb* faces the nutrient-deficient environment of the macrophage phagosome and switches to lipids, including cholesterol, as its main source or carbon and energy. Extensive research has been done on the degradation of the cholesterol AB rings, but much less is known about the degradation of the aliphatic side-chain, which is thought to be shortened by -oxidation reactions. Our laboratory investigates the role of several *fadD* and *fadE* genes, coding for acyl-CoA ligases and acyl-CoA dehydrogenases, respectively. To elucidate the catalytic function and determine the essentiality of these genes in the degradation of cholesterol side-chain, deletion mutant strains are being generated in *Mycobacterium bovis* BCG (BCG) and *Mycobacterium smegmatis* strains by homologous recombination using specialized-transducing mycobacteriophages and recombineering system approaches. As of now, a deletion mutant of *fadE27* in BCG, and *fadD17* and *fadD19* single and double KO strains of *M. smegmatis* were successfully generated. BCG *fadE27* cells did not exhibit a profound growth defect on either cholesterol or cholate, but grew better on glycerol compared to the wild-type strain. Preliminary data also suggested that the deletion of the *fadD19* and/or *fadD17* genes showed that they might be involved in the degradation of cholesterol side-chain. A metabolomic approach will be implemented to further characterize the utilization of cholesterol by these enzymes.

Funding Source: NCRR (5G12RR008124), NIMHHD (8G12MD007592), NSF (DUE-1153832)

Recommended Citation:
Escalante , Veronica ; Abou-Fadel , Johnathan ; Loya , Yolva ; Soto , Olga ; Ruiz , Juancarlos ; Ouellet , Hugues . "Cholesterol side-chain degradome of Mycobacterium tuberculosis" (2014). COURI Symposium Abstracts, Spring 2014, ID= 341

Synthesis and characterization of nano-micellar metallic organic frameworks

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Metal organic frameworks (MOFs) are an interesting class of crystalline materials that can be readily assembled by combining metal ions (components of nodes) and different organic ligands (structural linkers) via coordination chemistry, typically under solvothermal reaction conditions. Controlling the size and shape of the crystals is an evolving area in MOF research, since controlling and manipulation are means for optimizing the physical properties of the solids for specific applications. The successful functionalization of HKUST-1 with many organic ligands has encouraged us to explore the synthesis of analogues of MOF's of the HKUST-1 type. Modulators such decanoic acid have been employed to adjust the size and shape of MOF crystals at room temperature. In our research different concentrations with decanoic acid were used as modulators to synthesize for the first time nano-micellar metallic organic framework that may have important application in technology and medicine.

Recommended Citation:
Fernandez , Juan ; Gonzalez , Gabriel ; Noveron , Juan . "Synthesis and characterization of nano-micellar metallic organic frameworks" (2014). COURI Symposium Abstracts, Spring 2014, ID= 364

Super bulky guanidinates for the synthesis of molecular, titanium nitrides as well-defined precursors for titanium nitride semiconducting thin films for application in dye-sensitized solar cells

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Dye-sensitized solar cells (DSCs) are a tantalizing alternative to silicon-based solar cells. DSCs usually have a counter electrode made from platinum, which increases cost and makes large-scale production more complicated. An alternative to the platinum counter electrode is the use of titanium nitride (TiN), which is a material that functions similarly due to the high electrical conductivity, chemical inertness, and durability. The low cost of TiN makes this compound an enticing alternative, but its production is a complicated process that requires harsh conditions. The Fortier group is seeking a route to the low-temperature synthesis of TiN by first synthesizing well-defined TiN molecular precursors supported by 'super bulky' ligands. Results regarding the syntheses of these ligands and their coordination chemistry will be presented.

Funding Source: Partnership for Research and Education in Materials (PREM)

Recommended Citation:
Griego , Leonel ; Maity , Arnab ; Fortier , Skye . "Super bulky guanidinates for the synthesis of molecular, titanium nitrides as well-defined precursors for titanium nitride semiconducting thin films for application in dye-sensitized solar cells" (2014). COURI Symposium Abstracts, Spring 2014, ID= 413

One-pot synthesis of indole-4,7-diones from quinones

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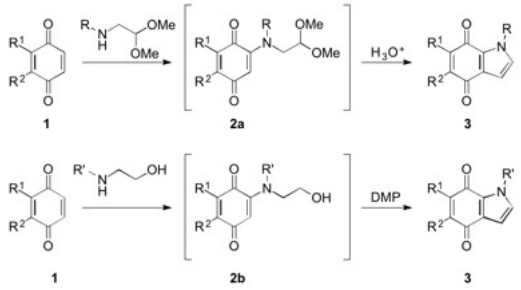
Indolequinones have been employed in synthetic applications for decades. Initially, they were mainly used as important building blocks of marine alkaloids. In the area of medicine, indolequinones are vital in human pancreatic cancer cell research due to favored cytotoxicity. Studies reveal that indolequinones can also serve as effective prodrug-releasing agents in the treatment of tumor cells. Recent methodological developments for the synthesis of indole-4,7-diones have drawn attention again. In our research, a new method was investigated to obtain indole-4,7-diones from quinones in one-pot. The initial step was a Michael-type reaction of a quinone derivative with an amine. Depending upon the structures of the starting amines, the reaction mixture was then treated with acid or Dess-Martin periodinane to afford cyclic products. We speculate that the mechanism involves an in-situ carbonyl formation from 2 followed by cyclization. Indole-4,7-diones 3 were confirmed by ^{1}H and ^{13}C NMR.



Recommended Citation:
Guerra , Jorge ; Luu , Quang ; Mito , Shizue . "One-pot synthesis of indole-4,7-diones from quinones" (2014). COURI Symposium Abstracts, Spring 2014, ID= 312

SGT-alpha: a novel therapeutic target for prostate cancer

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Steroid Hormone Receptors (SHRs) are essential for the regulation of developmental, reproductive, and physiological homeostasis in eukaryotes. SHRs belong to the nuclear receptor superfamily and comprise the androgen (AR), glucocorticoid (GR), progesterone (PR), mineralocorticoid (MR), and estrogen receptors (ER). Understanding their regulation is critical for the development of novel therapeutic strategies for SHR-mediated diseases such as prostate cancer and infertility issues. The Heat shock proteins (Hsp) 90/70 kDa are vital for the dynamic chaperone complex that drives SHRs folding. Different chaperones and co-chaperones allow the receptor to be either positively or negatively regulated. The recently identified co-chaperone human small glutamine-rich TPR-containing protein alpha (SGT-alpha) has been associated to Hsp70 and Hsp90 binding to antagonize the AR transcriptional activity. Interestingly, we have demonstrated that SGT-alpha can also regulate GR and PR using functional yeast and mammalian reporter assays. On the other hand, another TPR-containing protein, FKBP52, has the ability to positively regulate the same receptors. Surprisingly, when co-expressed SGT-alpha and FKBP52 in yeast and mammalian systems, SGT-alpha continues to abrogate receptor's transcriptional activity. Although both proteins bind Hsp90's and 70's conserved EEVD motif through their TPR domain, our data suggests that SGT-alpha activity is not solely due to a competition for those spots, but it may have some role at the transcriptional or translational level. Additionally, our data shows that the mutant K160A SGT-alpha, which is within the TPR domain, has a decreased affinity to bind Hsp90, which drives the Androgen Receptor's maturation, and therefore losing ability to regulate the receptor.

Funding Source: National Institutes of Health,

Synthesis of hydrogen-bonding triphenylamine derivatives for the preparation of electron donor-acceptor networks

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The synthesis and structural characterization of a triphenylamine derivative functionalized with carboxylic acids and 2,1,3-benzothiadiazole will be presented. This molecule is designed to form hydrogen-bonded polymers of alternating donor-acceptor components, in which effective electron transfer from electron donor to acceptor is predicted. The space in which electrons will travel between donor/acceptor groups, which is based on the self-assembly of photovoltaic hydrogen bonding arrays, can also be lower in energy and high in stability when compared to photovoltaic covalent arrays. The advantage of this approach to the formation of ordered donor acceptor assemblies resides in the dynamic and “self-correcting” nature of the hydrogen-bonding interactions in -CO2H functionalized systems, which is predicted to guide the components into well-defined structures. Distinct from covalent arrays, hydrogen bonding photovoltaic polymers may prove to have higher stabilities as well as lower formation energy strictly due to the ability to arrange into more efficient conformational polymers. The self-assembly of hydrogen bonding systems and the functionalization of these polymers on a solid surface make them prospective candidates for efficient energy transfer. A long-term goal for these types of molecules involves the determination of their power conversion efficiencies, possibly in solar cells.

Funding Source: National Science Foundation

Recommended Citation:
Harmon , Taylor ; Jimenez , Alex ; Nunez , Jose . "Synthesis of hydrogen-bonding triphenylamine derivatives for the preparation of electron donor-acceptor networks" (2014). COURI Symposium Abstracts, Spring 2014, ID= 363

Electron spin resonance (ESR) spectroscopic studies of endohedral fullerenes

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Endohedral metallofullerenes (EMFs) are variable-size carbon cages that enclose atoms, ions or clusters inside. EMFs are promising candidates as n-type materials in organic photovoltaic devices due to their electronic properties, which can be studied via their cation and anion radicals. These studies are able to sample the Highest Occupied Molecular Orbitals (HOMO) and the Lowest Unoccupied Molecular Orbitals (LUMO), which are crucial to understand and improve the electronic properties for optimal performance in solar cells. Here we present the study of the electronic properties of different EMFs using electron spin resonance (ESR), a non-destructive, analytical technique used to probe electron and spin densities of paramagnetic materials. We have reproduced some reported results, starting with the spectrum of the anion radical of C_{60}, followed by the corresponding one for $Sc_3N@C_{80}$-I_h. We also recorded the ESR spectrum of $La@C_{82}$, a paramagnetic compound that is best represented as $La^{3+}@C_{82}^{3-}$, where two of the carbon cage electrons are paired, leaving a net unpaired spin delocalized over the surface and the cluster. Hyperfine splitting from the La nucleus was clearly resolved, with a value of 1.15 Gauss. Single electron reductions were performed using decamethyl-cobaltocene ($CoCp_2^*$), a powerful reducing agent, under an inert atmosphere. Other endohedral compounds currently under investigation include: $Ti_2S@C_{78}$-D_{3h}, $Sc_3N@C_{80}$-D_{5h}, $Y_3N@C_{80}$, which are unique to our research group, and will be reduced with $CoCp_2^*$ or oxidized using tris(4-bromophenyl)aminium hexachloridoantimonate to analyze their LUMO and HOMO levels, respectively.

Funding Source: NSF

Recommended Citation:
Hernandez , Gustavo ; Echegoyen , Luis . "Electron spin resonance (ESR) spectroscopic studies of endohedral fullerenes" (2014). COURI Symposium Abstracts, Spring 2014, ID= 387

Synthesis and characterization of novel acylated quinonlinediol aluminum (III) complexes

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Organic light emitting diodes (OLEDs) are composed of an organic compound whose electroluminescent layer responds to an electrical current by emitting light. In the future of televisions, monitors, and many other light emitting devices the capability of displaying visible light will be heavily dependent on OLEDs. A highly used OLED includes Tris (8-hydroxyquinolate) aluminum (III) [Alq_3] due to its electron transport and optical properties. Recent research has demonstrated the potential of different Alq_3 derivatives to extend the OLEDs' stability and enhance their electron transport proficiency. Our goal is to prepare Alq_3 derivatives with such better properties.

Our research already demonstrated certain characteristics within the 6-acyl-5,8-quinolinediols: The quinolinediol ligand has resulted in appropriate levels of durability and stability, but unfavorably decreased solubility – suggesting polymer formation. This is an undesired result as solubility is important in manufacturing devices. Our current efforts are to increase solubility through changes within the quinolinediol ligand to further enhance its benefits.

Throughout this experimental process the products have been and will continue to be analyzed by NMR, UV-Vis and mass spectrometry. Furthermore, it is our goal to synthesize a library of compounds, specifically detailed on their light-emitting performance and stability.

Funding Source: NSF

Recommended Citation:
Jacinto-Moreno , Anwar ; Fernandez , Salvador ; Jacinto , Brian ; Mito , Shizue . "Synthesis and characterization of novel acylated quinonlinediol aluminum (III) complexes" (2014). COURI Symposium Abstracts, Spring 2014, ID= 303

Mechanistic investigation of small molecules with antioxidant properties as radical inhibitors

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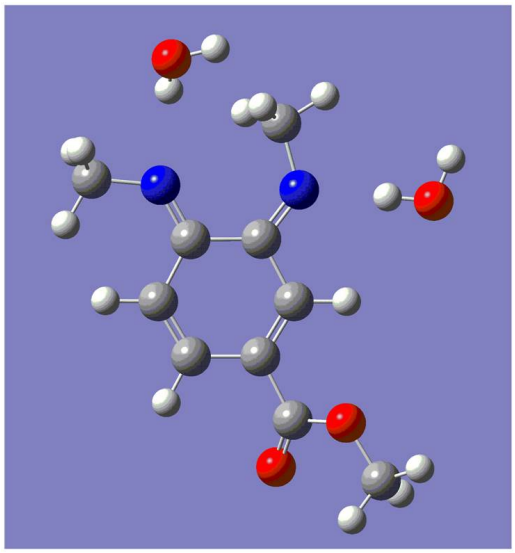
Antioxidants (also known as scavengers or reducing agents) are well used in the food industry to prevent spoilage, and in the materials industry to slow the oxidative degradation of polymers, plastics and fine chemicals. Ferrostatin-1 (Fer-1) was recently identified as a potent and selective inhibitor of non-apoptotic, iron-dependent, oxidative cell death in human fibrosarcoma HT1080 cell lines (Dixon et. al. Cell 2012). Fer-1 is an antioxidant that inhibits the lipid peroxide and therefore cell death. However the mechanism of the radical species inhibition is still unknown. We will investigate, in this study, if these antioxidants are inhibiting radical species through electron transfer, hydrogen abstraction or a combination of both mechanisms. In the first part of this study, we will synthesize a set of Fer-1 analogs using organic chemistry tools; assess their *in vitro* antioxidant properties using the well-known DPPH assay then evaluate their radical properties using electron paramagnetic resonance (EPR) technique. In the second part of this project, we will estimate the stability of the mono and bi-radical intermediates using computer based approach using Semichem Inc. AMPAC SCI PM3 methods using a simple hydroxyl radical to assess the possible mechanism of the antioxidants molecules. This multidisciplinary research project will potentially elucidate the possible mechanisms of the inhibition of the radical species such as hydroxyl radical.



Funding Source: N/A

Recommended Citation:
Licon , Diandra ; Skouta , Rachid ; Dirk , Carl . "Mechanistic investigation of small molecules with antioxidant properties as radical inhibitors" (2014). COURI Symposium Abstracts, Spring 2014, ID= 296

Bisphenol A removal from water using activated carbon-alginate and bentonite-alginate beads

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The United States alone produces annually more than 800 million kg of Bisphenol A (BPA), a chemical used to manufacture polycarbonates for plastic products and to make epoxy resin linings. This industrial waste is eventually released to the environment by the effluents of wastewater treatment plants. BPA is classified as an Endocrine Disruptor Compound (EDC), which has been shown to exert effects that result in behavioral changes, altered growth, and early secondary sexual maturation. The objective of this project was to select eco-friendly materials that will remove BPA and, in the future, can be used at wastewater treatment plants. Bentonite and activated carbon were chosen due to their sorptive properties, which stem from their high surface area. They have been previously used to remove metal ions from aqueous solutions; but there is no further study into EDCs removal. These physical properties were used along with the gelling properties of alginate to develop alginate gel-based (hydrogel) adsorbent beads; these samples were added to a 10ppm BPA solution and sampled in different time intervals to determine the removal rate. Stir bar sorptive extraction (SBSE) was then performed on the BPA solution samples before being quantified by gas chromatography-mass spectrometry to determine their removal ability. Based on the investigated range, the activated carbon-alginate hydrogel beads have shown the best removal performance: 100% removal of BPA in 50 minutes. Bentonite-alginate hydrogel beads only removed 32% in 60 min. Dry activated carbon-alginate beads removed 87% in 180 minutes.

Recommended Citation:
Loya-Posada , Alma ; Teoh , Wah Tzu ; Lee , Wen-Yee . "Bisphenol A removal from water using activated carbon-alginate and bentonite-alginate beads" (2014). COURI Symposium Abstracts, Spring 2014, ID= 358

Mechanism of Na-D-beta-hydroxybutyrate neuroprotection and combination therapy with ellagic acid

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Elevated levels of reactive oxygen species (ROS), is associated with the pathogenesis of neurodegenerative disorders. Rotenone, a mitochondrial stressor, induces the S-nitrosylation of protein disulfide isomerase (PDI), an important protein that serves as a neuroprotectant in the brain. The S-nitrosylation of PDI (SNO-PDI) results in the aggregation of synphilin-1, a minor specific biomarker of Parkinson's disease (PD). However, overexpression of wild type PDI attenuates the accumulation of synphilin-1 aggregates. While some small neuroprotectant molecules such as ellagic acid (EA) scavenge ROS and prevent the formation of SNO-PDI, others don't share this mechanism. Na-D-beta-hydroxybutyrate (NaßHB), ketone body and histone deacetylase inhibitor found in the brain during glucose starvation, has been proven to be effective mitigating the effects of rotenone-induced synphilin-1 aggregation and rotenone-induced apoptosis, thus making it an effective neuroprotectant. The mechanism of action remains unknown; however, it has been proven that NaßHB does not intervene directly in the scavenging of ROS. For this reason we investigated the mechanism in which NaßHB is able to mitigate the effects of rotenone-induced stress in the cell line SH-SY5Y and the effects of the combination therapy with EA. We hypothesize that the combination therapy of EA and NaßHB will mitigate the effects of rotenone insult. In addition, NaHßB will up-regulate the expression of PDI, counteracting the effects of rotenone-induced S-nitrosylation of PDI. To test this hypothesis, SH-SY5Y cells were treated with different concentrations of rotenone, EA and NaßHB. Cell viability along with the expression of PDI and the formation of SNO-PDI were determined.

Funding Source: Alzheimer's Disease Research Foundation

Recommended Citation:
Marin , Jose ; Kabiraj , Parijat ; Narayan , Mahesh . "Mechanism of Na-D-beta-hydroxybutyrate neuroprotection and combination therapy with ellagic acid" (2014). COURI Symposium Abstracts, Spring 2014, ID= 356

Large-scale molecular dynamics simulation of stereo-lithographically 3-D printed zinc(II)-containing polymers

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Additive manufacture of custom-made objects in 3-D via stereolithography, which involves the photo-polymerization of acrylate-containing molecules, has the potential to develop novel functional materials for many advanced technological applications. Stereolithography has advanced to the level of printing objects with 1mm resolution and is expected to increase to the submicron resolution in the next few years. However, the products of this additive manufacture process has not been studied at the atomistic level. We prepared a Zinc(II) acrylate complex with the ability to photopolymerize into 3-D objects using stereolithography, and carried out large-scale molecular dynamics simulations using long-range electrostatic energy and forces calculated using particle-mesh-based Ewald molecular mechanics techniques in explicit solvent systems. The results of these simulations and an account of experimental observables related to physio-adsorption and release of small molecules will be presented.

Recommended Citation:
Miranda , Michael ; Bahadorzadeh , Shakooh ; Perez , Mireya ; Wicker , Ryan ; Noveron , Juan . "Large-scale molecular dynamics simulation of stereo-lithographically 3-D printed zinc(II)-containing polymers" (2014). COURI Symposium Abstracts, Spring 2014, ID= 329

Structural and functional studies of circadian rhythm protein human cryptochrome1

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Integrated within the human body is a biological clock that is reset every 24 hours. The circadian rhythm is responsible for sleep-wake cycles and has been linked to a variety of metabolic processes such as hormone production and cell regeneration. Disrupting the events of the circadian clock would have adverse consequences in the timing of cellular and metabolic events resulting in health deterioration. Human cryptochrome1 (hCRY1) is a critical component in the sleep-wake cycle. The interaction of hCRY1 with a protein known as Period forms a complex that inhibits its own production by impinging on the factors responsible for their transcription. The objective of this research is to determine the three dimensional structure of the hCRY1 protein to shed light on the molecular details of the circadian rhythm. Previous investigations with full length mammalian cryptochromes have shown that the highly flexible C-terminal tail increases propensity for degradation and ultimately the aggregation of the protein. This is consistent with our initial expression of the full length hCRY1, which produced aggregated protein. The gene encoding hCRY1 is currently being cloned into an expression vector as a truncated version that excludes the C-terminal flexible domain. Future directions include affinity and other chromatography techniques to obtain a highly homogeneous hCRY1 protein that will be used to characterize the structural and functional details of hCRY1.

Funding Source: National Science Foundation (NSF)

Recommended Citation:
Peralta , Jasmine ; Avila , Gustavo ; Xiao , Chuan . "Structural and functional studies of circadian rhythm protein human cryptochrome1" (2014). COURI Symposium Abstracts, Spring 2014, ID= 309

In search of efficient drugs against Trypanosoma cruzi

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Ferrostatin (Fer-1) is as a potent and selective small molecule inhibitor of a novel form of oxidative cell death, known as ferroptosis. This discovery of ferrostatin was initiated in 2010 using in silico and high-throughput screening of 3.37 million commercial and 9,500 lead optimized compounds (LOC), respectively, from which 50 candidate inhibitors of lipid ROS production were identified. Among these 50 candidates, Fer-1 was shown to be the most potent and specific inhibitor of a unique form of non-apoptoptic, iron-dependent, oxidative cell death in HT- 1080 cells (Dixon et al., 2012). The novel cell death "Ferroptosis" is an iron-dependent form of non-apoptotic cell death recently discovered in the laboratory of Professor Stockwell (Dixon et al., 2012). *Trypanosoma cruzi* induces the Reactive Oxygen Species (ROS)-PARP-1-RelA pathway for up-regulation of cytokine expression in cardiomyocytes (Xueqing et al., 2010). We are pursuing the hypothesis that it is possible to create various Fer-1 analogs which will be effective against parasite disease models such as Chagas disease through iron-dependent form of non-apoptotic oxidative cell death. Our preliminary data shows that one of the Fer-1 analogs, SRS 13-33, has a lethal dose of approximately 3-4-fold compared to the first Fer-1.

Recommended Citation:
Perez , Andrea ; Iniguez , Eva ; Maldonado , Rosa ; Costa , Thadeau ; Skouta , Rachid . "In search of efficient drugs against Trypanosoma cruzi" (2014). COURI Symposium Abstracts, Spring 2014, ID= 297

Investigating the role of the DNA repair proteins Ku80 and Poly (ADP-ribose) polymerase-I in the HIV-1 life cycle

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HIV-1, like other retroviruses, reversely transcribes its viral RNA genome into a DNA copy that has different fates in the nucleus of the infected cell. A fraction of the viral cDNA is integrated into the host genome, a requirement for productive infection, whereas the cDNA that fails to integrate is degraded or circularized in the nucleus. Integration is catalyzed by the viral enzyme integrase, and recently potent integrase inhibitors have entered the clinic. Therefore, it is expected that patients treated with these new drugs will accumulate significant amounts of circular HIV-1 cDNA forms during the course of the acute infection. The impact of these circular forms of reversely transcribed HIV-1 genome on the cell physiology and ultimately in the pathogenesis of the infection is unknown and deserves further study. The non-homologous end joining (NHEJ) DNA repair pathway is responsible for the formation of circular forms of the HIV-1 genome. In particular, an important role of Ku80 has been indicated in non-human cell lines. More recently, a role of Poly (ADP-ribose) polymerase-I (PARP-1) in NHEJ has been demonstrated. However, the implication of this enzyme in the formation of the HIV-1 genome circular forms and its interplay with Ku80 has not been investigated yet. Our results could suggest a novel role of PARP-1 activity in this step of the HIV-1 life cycle

Funding Source: NIH

Electrooxidatively polymerized hole transporting layers in organic-inorganic solar cells

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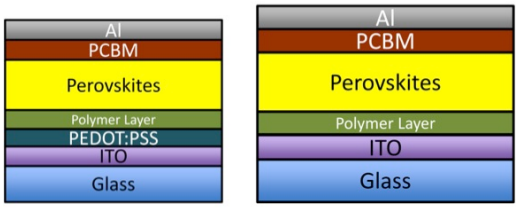
Organic-inorganic (hybrid) solar cells have received considerable attention lately because they exhibit very high power-conversion efficiencies (PCEs), even in bilayer structures. Perovskites have emerged as new materials for highly efficient hybrid solar cells with PCEs reaching approximately 16%. Triphenylamines (TPA) are well known for their excellent hole transporting properties, although their light absorption is limited to the UV region of the solar spectrum. Additionally, they are easily electrooxidatively polymerized. Herein, we incorporate electrooxidatively polymerized hole transporting layers of TPA-Zn^{II}-Porphyrin derivatives in organic-inorganic Perovskite-based solar cells. Two deposition methods were used for the Perovskite layer: solution-processed and vapor-processed. These solar cells reached PCEs of >1% and >6%, respectively.



Funding Source: National Science Foundation

Recommended Citation:
Quinonez , Paulina ; Rivera-Nazario , Danisha ; Molina-Ontoria , Agustin ; Echegoyen , Luis . "Electrooxidatively polymerized hole transporting layers in organic-inorganic solar cells" (2014). COURI Symposium Abstracts, Spring 2014, ID= 371

Synthesis of Co/MoS2 catalysts supported in novel carbon source for hydrodesulfurization reactions

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Sulfur content of fuels has been cut down to ultra-low levels by environmental regulation in the US and around the world. As a consequence, research on the production of ultra-low sulfur fuels has gained enormous interest in the scientific community worldwide. This study presents the synthesis of two Co/MoS2 catalysts supported in a novel carbon source that employs two different types of resins from crude oil to act as support to enhance the catalytic properties of the Co/MoS2, embracing the pathway of the reaction to hydrogenolysis in the hydrodesulfurization of Dibenzothiophene. Experimental data was obtained in a high-pressure 300 mL Parr reactor at 543 K and 35.91 kPa, both samples showed high catalytic activity when compared with a commercial catalyst. The catalysts were characterized by BET, XRD, SEM and HRTEM.

Funding Source: RISE

Potential use of withaferin A, psoralidin, and Fer-1 analogs, as preventive treatments for Parkinson's & Alzheimer's diseases

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It is estimated that Alzheimer's disease (AD) affects 5.4 million people in the US, being the sixth-leading cause of death, and 35.6 million worldwide. Also, around one million people in the US have Parkinson's disease (PD) and so do 10 million people around the world. Neurodegenerative disorders such as AD and PD have been shown to progress due to oxidative damage to critical proteins, via free radical induced damage. Phytochemicals extracted from plants, along with their derivatives, have been used effectively against cancer, angiogenesis, tumors, etc. by different research groups around the world. Therefore, we hypothesize that the plant-derived polyphenols, withaferin A and psoralidin, as well as Fer-1 analogs, can mitigate oxidative stress and the onset of oxidative stress-related Parkinson's and Alzheimer's diseases and help prevent them addressing one main of their many causes.

We determined the capacity of the aforementioned compounds to scavenge free-radicals. We used in vitro assays to expose the phytochemicals to model reactive oxygen species generators. Mass spectrometry, Ultraviolet–visible spectroscopy, and High-performance Liquid Chromatography were used to determine the in vitro scavenging potential of the compounds. Parallel to their effectiveness determination, we will employ dopaminergic cell lines such as SH-SY5Y or PC- 12 for in vivo studies. Parkinsonian biomarker accumulation will be induced by the mitochondrial oxidative stressor rotenone and analyzed using fluorescence microscopy. Finally we will determine whether cells pre-treated with our compounds can mitigate oxygen species with induced biomarker accumulation.

Funding Source: NSF, COURI

Recommended Citation:
Ramirez , David ; Skouta , Rachid ; Narayan , Mahesh . "Potential use of withaferin A, psoralidin, and Fer-1 analogs, as preventive treatments for Parkinson's & Alzheimer's diseases" (2014). COURI Symposium Abstracts, Spring 2014, ID= 306

Identifying small molecules targeting FKBP52 as a novel treatment for prostate cancer

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Prostate cancer is the most common cancer and among the leading causes of male cancer deaths in industrialized nations. Current treatment options are often invasive and/or lack efficacy once the disease advances to the hormone-independent stages termed hormone refractory prostate cancer (HRPC). Our lab is actively pursuing novel drugs that are effective even as the disease progresses to castrate-resistant stage. The heat shock protein 90 (Hsp90)-associated 52-kDa FK506-Binding Protein (FKBP52) plays important roles in steroid hormone receptor regulation including the androgen receptor (AR). Our lab previously identified MJC13 that specifically inhibits FKBP52-regulated AR function by targeting the AR BF3 surface. The studies detailed here aim to further characterize the FKBP52-AR interaction, and to target those interactions with small molecule inhibitors targeting the AR interaction surface on FKBP52. Our data suggest that the FKBP52 proline-rich loop that overhangs the PPIase catalytic pocket on FKBP52 serves as an AR interaction surface, and represents the most promising target site. We employed an *in silico* screen of the ZINC library to identify a series of molecules that are predicted to bind with high affinity within the FKBP52 PPIase pocket. Ten lead molecules have been identified that inhibit AR-mediated expression of a reporter gene with IC_{50} values ranging from the high nanomolar to low micromolar. Future studies will assess molecule effects on AR-dependent gene expression and proliferation in prostate cancer cells. Ultimately, the proposed studies aim to identify a novel class of drugs will serve as promising drug candidates for the treatment of prostate cancer.

Funding Source: NIH

Large-scale molecular dynamics study on carbon nanotube polymer composites

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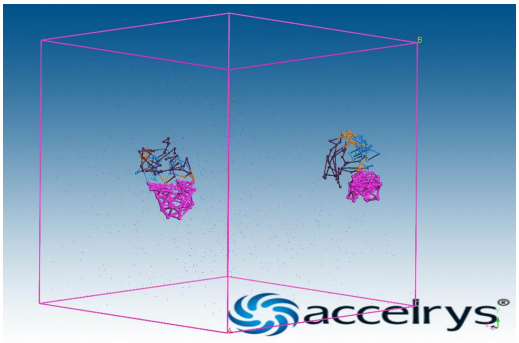
Given the enormous Young's modulus (E = 1 TPa) and high tensile strength (63 GPa) that single- and multi-wall carbon nanotubes (CNT) exhibit, polymers with low dielectric constants (e < 5) that contain CNT homogenously dispersed throughout the structure may have improved physical and mechanical properties. Currently, there are some methods by which CNT-polymers can be thoroughly mixed, but they involve direct chemical modification of the CNT, such as the covalent insertion of short polymer strands into the end-caps of CNTs prior to their mixing with high molecular weight polymers. We are developing non-covalent coordination polymers that directly interact with CNTs and disperse them into homogenous mixtures. To help in this design, we have carried out large-scale molecular dynamics simulations using coarse-grain methods of CNT and lipid-containing coordination polymers. This function replaces polymer/CNT segments with repetitive patterns, motion groups, and subunits while preserving their overall topology to convert to Mesocale containing beads and connectors representing aggregated atoms and bonds, respectively. A solvent-filled system was built to accommodate two adjacent rods with coarse-grained CNTs and polymer, creating three distinct fillers of relative amounts of 1.00:1.00:1.00 per filler. Polarities and bond and stretch, among others, resulted from simulation techniques in the MS Martini forcefield. Subsequently, the system underwent Geometry Optimization, assuring accurate values of convergence in regards to the distance/placement and interaction between the molecules. Furthermore, Mesocite Dynamics canvassed established forces until equilibrium was reached. Results conveyed a clear image of the close and continued interaction between the self-assembled molecule and the carbon nanotube concentrations.



Recommended Citation:
Rodarte , Erica ; Noveron , Juan . "Large-scale molecular dynamics study on carbon nanotube polymer composites" (2014). COURI Symposium Abstracts, Spring 2014, ID= 389

Electronic communication in covalently linked mixed-valent compounds

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Mixed-valent systems of ferrocene dimers and bimetallic units have been used as platforms for the study of ET (electron transfer) reactions. Mixed-valent (MV) compounds have two redox centers connected by a linker. The bimetallic units act as charge bearing redox centers which are donor and acceptor groups for ET. The ferrocene dimers behave in a similar manner but instead of bimetallic units, the molecules are composed of ferrocene centers linked by an ethylene bridge. The ferrocene dimers were made via a coupling reaction of two monoacetylferrocene molecules. We have synthesized MV systems where each redox center is composed of a Mo_2 unit bridged by either of two organic linkers. The reaction of $Mo_2(O_2CCH_3)(DAniF)_3$, DAniF = N,N' –di-p-anisylformamidinate, with 2,5-Bis(methylamino)-1,4-benzoquinone gives a covalently bridged dimer where the Mo_2 units are bridged by the 2,5-Bis(methylamino)-1,4-benzoquinone. A similar reaction with $Mo_2(O_2CCH_3)(DAniF)_3$ and indigo, 2,2'-Bis(2,3-dihydro-3- oxoindolyliden), also gives a covalently bridged dimer. The electronic communication between the metal centers of these compounds is observed when one of the centers is oxidized and the other center on the opposite side of the covalent linker responds to this loss of electrons from the oxidized center. The electronic communication of these mixed-valent compounds has been measured using cyclic voltammetry, spectroscopy, and DFT (density functional theory) calculations. We have found that the electronic communication is strong with these organic linkers, and the ferrocene dimers serve as simple models for ET studies, so much so that they and the methods in this research have been applied to creating a physical chemistry laboratory learning module.

Funding Source: STEM-RTI (NSF)

The synthesis and assessment of metal detecting fluorophores

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BODIPY (4,4-difluoro-4-bora-3a, 4a-diaza-s-indacene, figure 1) molecules can be used as bio-tags, laser dyes and metal sensors due to their strong fluorescence intensity. We have used the 8-thiomethyl-BODIPY as the starting material and attempted to attach a cysteamine, $NH_2CH_2CH_2SH$, to the 8th position using both the nitrogen and sulfur atoms to create two different derivatives. The resulting products will permit the BODIPY to attach to soft and hard metals by binding to the sulfur and nitrogen, respectively. We have synthesized the BODIPY bonded with nitrogen where the thiomethyl from the starting material forms a sulfur-sulfur bond. In order to attach the BODIPY to the sulfur we had to protect the cysteamine with FMOC –chloride ($C_{15}H_{11}ClO_2$). Preliminary results of the new fluorophores with metals ions will be presented. By providing training and practice opportunities on the basic techniques of teaching and engaging students, the STEM Research Teaching Integration program (STEM-RTI) allowed for this project to be integrated into a course module based on core concepts of fluorescence, the key feature of the BODIPY molecules. The module was taught in an inorganic chemistry course.

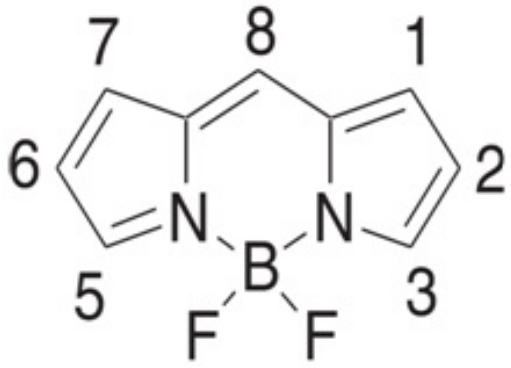


Figure 1

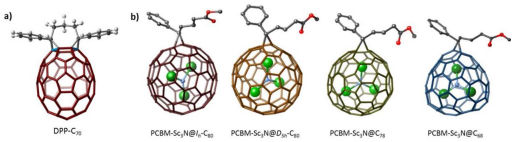
Funding Source: Welch, NSF

PCBM methano derivatives of Sc3N@Cn (n = 68, 78, 80) and empty fullerene bis-adducts as acceptors for OPV devices

Juan A Valdez-Moreira[^], Maira R Ceron, Marta Izquierdo Barroso, Luis Echegoyen*

Department of Chemistry, The University of Texas at El Paso.

The use of fullerenes as acceptors in organic photovoltaics (OPVs) is rapidly developing, mainly because of their favorable electron accepting abilities; their low recombination energies upon electron transfer; their high charge transport capabilities in 3D and spherical symmetry. The most common fullerene derivatives used as acceptors in OPVs are $PC_{61}BM$ (Phenyl Carbon 61 Butyric Acid Methyl Ester), $PC_{71}BM$ and $IC_{61}BA$ (Indene Carbon 61 Bis-adduct). For these reasons we synthesized new PCBM-fullerene bis-adducts based on C_{60} and C_{70} using biscarbene addition reactions and characterized by spectroscopic techniques. Futhermore, a mixture of $Sc_3N@D_{5h}$-C_{80} and $Sc_3N@D_3$-C_{68} was separated taking advantage of their different chemical behavior to synthesize their PCBM derivatives. The PCnBM-type derivatization was also achieved for the whole family of Sc_3N@Cn (n = 68, 78, 80) to explore their different reactivities and study their potential applications in Organic Photovoltaic Solar Cells.



Funding Source: NSF DMR-1205302

Recommended Citation:
Valdez-Moreira , Juan ; Ceron , Maira ; Izquierdo Barroso , Marta ; Echegoyen , Luis . "PCBM methano derivatives of Sc3N@Cn (n = 68, 78, 80) and empty fullerene bis-adducts as acceptors for OPV devices " (2014). COURI Symposium Abstracts, Spring 2014, ID= 374

Design and biological evaluation of anti-epileptic probes

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Epilepsy is the most misunderstood condition in medical science. It is estimated that more than 50 million people have epilepsy world wild and there are 2.4 million new cases each year. A recent study showed that mitochondria dysfunction has a considerable role in epileptogenesis. Mitochondria are crucial players in maintaining cell Ca^{2+} homeostasis and serve as Ca^{2+} buffer. As a consequence of Ca^{2+} influenced ATP production in the mitochondria, reactive oxygen species (ROS) are generated. It is proposed that under physiological conditions Ca^{2+} as well as ROS work as positive effectors and cellular signaling molecules, while their overload can lead to mitochondrial disfunction, oxidative stress and cell damage. Long term use of certain antiepileptic drugs has been proposed to increase free radical formation and cause oxidative damage in neurons. In this study, we are pursuing the design, synthesis and biological evaluations of compounds with antioxidant properties, that will reduce radical species that damage neurons in epilepsy.

Funding Source: N/A

Recommended Citation:
Valenzuela , Carlos ; Tena , Abahis ; Skouta , Rachid ; Fenelon , Karine . "Design and biological evaluation of anti-epileptic probes" (2014). COURI Symposium Abstracts, Spring 2014, ID= 301

Computer Science, Engineering, Physics & Mathematics

Design of an indirect super-critical carbon dioxide super-heater for solar power towers

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Renewable or sustainable energy sources are gaining momentum as the need to reduce harmful gas emissions becomes a priority. Concentrated Solar Plant (CSP) technologies harvest energy from the sun and store it to generate thermal energy that can be converted to electricity; however, they need to be optimized in order to become more efficient and viable. CSPs that use falling solid particle receivers may increase the temperature without becoming chemically unstable at the high temperatures that are required to maximize particle absorptivity. This study will discuss the efficiency and optimization of a direct absorption receiver model recently tested at Sandia National Laboratories by finding means of maximizing particle absorptivity and minimizing heat loss of materials. Computational Fluid Dynamics (CFD) software was used to model the particle receiver in ANSYS FLUENT™ and simulate several scenarios with changing heat fluxes where particles of Alumina, Alumina Silicate, Graphite, Iron, Limestone, Sand, and Silica fall through the aperture of the receiver at three different mass flow rates. The simulations demonstrate that with rising mass flow rate and power into the aperture, the solar receiver's efficiency increases as well as the particle temperature. From the materials tested, Alumina particles show the largest increase in both cases. The results of the simulations depict that material absorptivity is key to maximizing solar particle receivers and aid in the design and optimization of CSP plants.

Funding Source: COURI

The effect of processing variables on the fabrication of titanium-doped tungsten oxide thin films.

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Tungsten Oxide (WO_3) is a wide bandgap n-type semiconductor with unique electrical and optoelectronic properties ideal for optical applications. WO_3 is a promising transparent oxide to replace indium based transparent conducting oxides (TCOs) in a photovoltaic solar cell. If the increase in usage of indium-tin oxide (ITO) films for flat panel displays and solar cell continues, not only will the price of ITO continue to rise but also the availability of indium may be jeopardized in the near future. The development of alternative TCO materials with ideal properties for photovoltaic device applications is necessary. The objective of the present work is to derive a comprehensive understanding of the structure and optical properties of titanium (Ti)-doped WO_3 films deposited by co-sputtering of Ti and W metals. It is well known that the optical, electrical, and electro-optic properties of WO_3 are highly dependent on the surface/interface structure, morphology, and chemistry, which in turn are controlled by the fabrication technique and growth conditions employed. Each of these samples were fabricated by a technique called co-sputtering deposition of W and Ti metal targets. Pressure, temperature, and the sputtering method all play a huge role in how the samples come out and also on the results that are produced. It can be seen that there is a direct correlation between the pressure and temperature during sputtering and the resulting properties.

Recommended Citation:
Brown , Brittney ; Vargas , Mirella ; Chintalapalle , Ramana . "The effect of processing variables on the fabrication of titanium-doped tungsten oxide thin films." (2014). COURI Symposium Abstracts, Spring 2014, ID= 408

Analysis of ferroelectric ceramics fabricated by binder jetting technology

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ExOne's system binder jetting technology was used to fabricate 3D structures of two different ceramics for applications that include dielectric capacitors, sensors, and integrated circuits. The M-lab system used to fabricate samples for this project uses an organic binder (ethylene glycol monomethyl ether) to bond consecutive layers of powder. After building, the samples require a curing cycle and a sintering thermal process to complete fabrication.This project presents results obtained for $BaTiO_3$ fabricated by the M-Lab system and the continuation of the work, which consists on the fabrication of alumina (Al_2O_3) samples. Multiple building parameters and sintering profiles were analyzed and compared in an attempt to obtain dense parts. The results obtained yielded a 20% density for BaTiO3 and 50% for Al_2O_3.

Funding Source: DOE

Computational modeling of a high temperature direct tubular receiver design for supercritical carbon dioxide Brayton cycle

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As the demand for energy increases, new ways to generate it are been investigated, while ensuring a sustainable future. Renewable technologies to harvest solar energy have become an attractive option. Concentrating solar power (CSP) offers an economically friendly solution for the demand of energy. High-efficiency power cycles (which are sets of processes that involve work input, output, transfer of heat and change in pressure or temperature) have been incorporated in order to decrease the cost of CSP systems. A tubular receiver will be designed to be used as a super-heater to provide the required heat to a supercritical carbon dioxide (sCO2) Brayton Cycle, a high-efficiency power cycle. The purpose of this research is to develop various potential tubular receiver designs (i.e. dimensions, configuration, etc.) to compare and obtain the best possible arrangement, maximize the absorptance, minimize heat loss, and maintain a high structural stability at high temperatures. A computational fluid dynamics (CFD) analysis and finite element analysis (FEA) models were developed to analyze the behavior, thermal efficiency, and structural stability of a direct tubular receiver using sCO2 as the heat transfer fluid. In an effort to strive for efficiencies greater than 50%, the outlet temperature of the receiver has to be at least 700^{o}C while sustaining a working pressure of 20 MPa. Current testing results show an approximate 70% efficiency for the tubular receiver designs for direct heating.

Recommended Citation:
Castellanos , Alejandra ; Ortega , Jesus ; Kumar , Vinod . "Computational modeling of a high temperature direct tubular receiver design for supercritical carbon dioxide Brayton cycle" (2014). COURI Symposium Abstracts, Spring 2014, ID= 369

Development of a metamaterial based, low-cost, passive, wireless temperature sensor for harsh environment applications

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The continuous advancement in energy conversion technologies such as gas turbines and coal-based power plants has directed attention towards the increasing need for real time sensing of processing parameters. Particularly, continuous temperature monitoring is of utter importance in order to reach higher efficiencies and reduce the pollutant agents released to the atmosphere. However, the harsh environment conditions present in this type of applications have deemed current solutions unreliable due to the presence of semi-conductor materials and energy storage devices in their configuration. To overcome this issue, this research project focuses on developing a low cost, passive, wireless temperature sensor. The sensor design is based on the metamaterial concept by following a Closed Ring Resonator (CRR) structure. Finite element model and comparison was performed for different Split Ring Resonators (SRRs) and CRR structures using the HFSS software package. Fabrication was carried over following the traditional powder compression method using barium titanate ($BaTiO_3$) nanopowders as dielectric ceramic, commercial washers as metal rings and polyvinyl alcohol (PVA) as binder material. Additionally, sample fabrication through additive manufacturing using aluminum oxide (Al_2O_3) powders and binder jetting technology was performed. Preliminary free space testing was carried out using two Gaussian beam antennas and a vector network analyzer. The frequency range used is 2 – 18 GHz. Samples fabricated through both the traditional method and the binder jetting technology show excellent geometry and structural integrity. The results for the tested samples have shown exceptional signal to noise ratio and traces of resonance in the used frequency range.

Funding Source: Department of Energy

Recommended Citation:
Delfin , Diego ; Karim , Hasanul ; Shuvo , Mohammad ; Cadena , Monica ; Gaytan , Sara ; Wicker , Ryan ; Choudhuri , Ahsan ; Lin , Yirong . "Development of a metamaterial based, low-cost, passive, wireless temperature sensor for harsh environment applications" (2014). COURI Symposium Abstracts, Spring 2014, ID= 395

Automatic detection of first arrivals in seismic traces using a Fourier approach

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Detection of first arrivals on seismic traces is critical. They are used to determine the seismic velocity structure of the subsurface of the Earth. Normally, a human expert determines the first arrival time by visual inspection of signals; however, this is a very time-consuming process. Having a tool that automatically detects first arrivals enables experts to use large data sets for creating crustal velocity models with consistent pick-time quality and minimum computation time. However, the challenge for automated detection is ensuring that the mathematical model and the algorithm used at least match the quality of detection manually obtained by human analysts. We introduce a new algorithm using a Fourier approach. Also, we use probability measures to estimate the first arrival. These methods were tested using data from the British Columbia Coast Mountains Batholith and the Sillali experiment. Results show that our approach produces high-quality results for high signal-to-noise ratio, while achieving good execution times.

Funding Source: COURI Award

Recommended Citation:
Dosal , Manuel ; Fuentes , Olac . "Automatic detection of first arrivals in seismic traces using a Fourier approach" (2014). COURI Symposium Abstracts, Spring 2014, ID= 302

Improvement of prosthetic foot designs by developing a mechanical testing protocol

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The implementation of lower-limb prosthetic devices in the developing world requires a testing phase to ensure their optimum performance. The main objective of the project is to develop a mechanical testing protocol to verify the functionality of different prosthetic foot models, usually introduced in low-income nations, by satisfying the requirements of the testing standards.

The methodology includes static-deflection and fatigue tests following the guidelines established by the International Standards (ISO) 22675 and 10328. Test standards assist in the development of better prosthetic devices by quantifying test criteria; however no single test procedure can replicate the loading nature during gait. Therefore the compilation of a testing protocol contributes to the better understanding of factors such as foot inertial properties, shock absorption, stiffness and energy storage that can lead to design improvements of some existing low-cost feet prototypes. These prototypes are compared against the characteristics of the Niagara foot, an affordable energy storage model designed for active amputees.

The mechanical testing protocol presents load-deflection curves to compare, for example, the behavior of a low-cost carbon fiber prototype and the Niagara foot. Also some fatigue tests were carried following the ISO 22675 standard. Finally the design framework was completed to construct a fatigue tester that complies with the ISO 10328. The mechanical testing protocol is intended to be a guide to evaluate prosthetic foot designs and to provide geometric improvements based on performance factors.

Recommended Citation:
Duenas , Victor ; Gonzalez , Roger ; Nystrom , Aaron ; Gonzalez , Roger . "Improvement of prosthetic foot designs by developing a mechanical testing protocol" (2014). COURI Symposium Abstracts, Spring 2014, ID= 360

Air cooled condensers and the application of metal foam on the condenser tubes

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Power plants use a large amount of water for the cooling process of steam in their condensers. This water usage leads to significant water losses in the region ranging from 100 to 400 gallons/MWh limiting the placement of power plants and water in the area. However, alternatives exist to eliminate the water dependency in these power generation units. One solution is the implementation of air-cooled condensers (ACC). Air Cooled Condensers consist of a large fan that circulates air past the finned condenser tubes. Current tubes use fins, which due to their lower overall heat transfer coefficient, are known to consume 10% more power to keep cool in hot days. For this reason, a metal foam is considered instead of fin structures because of their high porosity, high surface to volume ratio and can significantly enhance flow mixing and turbulence due to the tortuosity of the passages. The metal foam that is used in the present project is designed by using UGS NX software and then tested in ANSYS FLUENT. The turbulence model is selected with three different free stream velocities of 3,5, and 7 m/s tested with two different types of metal foams with pores per inch (PPI) of 20 and 100. The simulation found that heat transfer coefficient was greater with the metal foam than those for fins. Likewise, the heat transfer coeficient for the metal foams increased as the porosity increased. Also, the pressure drop and velocity distribution were not significantly different between the two different porosity foams.

Funding Source: COURI

Recommended Citation:
Esparza , Alan ; Love , Norman . "Air cooled condensers and the application of metal foam on the condenser tubes" (2014). COURI Symposium Abstracts, Spring 2014, ID= 354

Three-dimensional shear wave model development of the Texas region using an optimization scheme

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For this research, our main purpose is to obtain a better understanding of the Earth's tectonic processes in the Texas region, which requires us to analyze the Earth structure. We expand on a constrained optimization approach for a joint inversion least-squares (LSQ) algorithm to characterize a one-dimensional Earth structure of Texas with the use of multiple geophysical data sets. We employed a joint inversion scheme using multiple geophysical data sets for the sole purpose of obtaining a three-dimensional velocity structure of Texas in order to identify an ancient rift system within Texas. In particular, we use data from the USArray, which is part of the EarthScope experiment, a 15-year program to place a dense network of permanent and portable seismographs across the continental United States. Utilizing the USArray data has provided us with the ability to image the crust and upper mantle structure of Texas. We simultaneously inverted multiple datasets from USArray data, to help us to better obtain an estimate of the true Earth Structure model. We prove through numerical and experimental testing that our Multi-Objective Optimization (MOP) scheme performs inversion in a more accurate, robust, and flexible matter than traditional inversion approaches.

Funding Source: National Science Foundation, Cyber-ShARE

Electronic structure of dye-functionalized fullerenes for use in organic photovoltaics.

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C_{60} fullerene and its derivatives are the most popular acceptors which are used in molecular/polymeric complexes for organic photovoltaics. We have studied the C60 molecule functionalized with two dye molecules: DPP (diketopyrrolo-pyrrole) and TBTDT (4,7-di(4-hexyl-2-thienyl)-2,1,3-benzothiadiazole). Using density functional theory and large polarized all electron Gaussian basis, we optimized the structures of the C60-DPP and C60-TBTDT molecules. The electronic structure of C60 changes upon functionalization with the dye molecules. The electron affinity of the functionalized fullerene increases. The optical spectra of the functionalized molecules will be presented. Inspection of molecular orbitals of these systems indicates that the HOMO (highest occupied molecular orbital) level is localized on the dye whereas the LUMO (lowest unoccupied molecular orbital) is on the C60 molecule. We have also calculated several lowest CT excited states where the charge transfer takes place from the HOMO on the dye to the LUMO on the C60 molecule. Charge transfer from the donor polymer P3MT (poly(3-methyltiophene)) to the acceptor DPP-C60 will be investigated.

Funding Source: PREM NSF

Visualization of PROV-O based provenance using data driven documents (D3)

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This project focuses on developing visual strategies for displaying provenance information structured according to the W3C PROV ontology (PROV-O). PROV-O is an Ontology Web Language (OWL) mapping of the PROV data model, which provides concepts and properties for describing past scenarios step-by-step. Many people depend on visual representations to really understand the underlying message some data or information captures, and results of this research are intended to impact these visual learners. This is especially important in scientific contexts where the information being analyzed is large and multifaceted.

In order to visualize PROV-O based provenance, we are using the JavaScript library Data Driven Documents (D3) that maps data to Document Object Model (DOM) elements. This library helps bring data alive by leveraging DOM technologies such as HTML, SVG, and CSS, which as a result of, increases the accessibility of resulting visualizations since they are available on the Web.

Recommended Citation:
Grajeda , Joshua ; Del Rio , Nick ; Villanueva Rosales , Natalia . "Visualization of PROV-O based provenance using data driven documents (D3)" (2014). COURI Symposium Abstracts, Spring 2014, ID= 391

Quantification of Mycobacterial phagosomal rupture in macrophages with fluorescence energy transfer microscopy

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Approximately one-third of the world population is latently infected by *Mycobacterium tuberculosis* (Mtb). It has been thought that *Mtb* resides in a membrane-bound compartment within its host cells during the entire infection cycle from the invasion of the cell to its death. Current studies have suggested that the transition from latency to active tuberculosis requires Mtb to penetrate phagosomal membrane and translocate to the cytosol of the host macrophage, termed as "cytosolic translocation". Here, we use *Mycobacterium marinum* (Mm) as a surrogate model organism to study the mechanisms of mycobacterial cytosolic translocation. Wild-type and mutant strains of M marinum and M smegmatis (non-pathogenic) were used to infect mouse macrophages. We visualize infected mouse macrophages utilizing two-photon fluorescence resonance energy transfer (*FRET*) microscopy; by means of a -lactamase-based FRET assay. FRET is a process whereby a fluorophore (the donor) in an excited state transfers its energy to a nearby molecule (the acceptor; also a fluorescent dye) by non-radiative dipole-dipole interaction. We obtained blue and green fluorescent images from the FRET kit. The ratio of blue/green was calculated as an indication of the presence of bacteria in the phagosome or cytosol. Higher fluorescent ratios have been obtained for M. marinum after 48 and 96 hours of infection, indicating its ability to gain access to the cytosol of macrophages. The use of sensitive cytoplasmic FRET reporter combined with our two photon laser scanning fluorescence microscope provides quantitative analysis of phagosomal rupture and cytosolic entry of cellular pathogens.

Recommended Citation:
Honsaker , Christian ; Acosta , Yassel ; Zhang , Qi ; Sun , Jianjun ; Li , Chunqiang . "Quantification of Mycobacterial phagosomal rupture in macrophages with fluorescence energy transfer microscopy" (2014). COURI Symposium Abstracts, Spring 2014, ID= 344

Characterization of titanium doped tungsten oxide thin films for photovoltaic applications with variant temperatures

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The development of new transparent conducting oxides (TCO's) is crucial for developing higher efficiency photovoltaic cells. Indium-tin oxide (ITO) is the common material found in the transparent conducting oxide (TCO) of the photovoltaic cell. A stable supply of ITO may be difficult to achieve for the recently expanding market for optoelectronic devices because of the cost and scarcity of indium, the principal material of ITO. The present work is focused on titanium (Ti)-doped tungsten oxide (WO_3) films as a potential candidate to replace the ITO layer in TCOs. WO_3 has important optical, electrical, and electrochromic properties that make it suitable for applications in the optical industry. It is well known that the resulting film properties are highly dependent upon the method of fabrication. The study of structural changes in optical coatings is essential for transparent oxides such as WO_3. The films were grown using rf-magnetron sputtering, co-sputtering W and Ti. In this research we are trying to characterize the optical properties of Titanium (Ti) doped Tungsten Oxide (WO_3) films, differences in microstructure, surface morphology. By varying deposition temperature transformations were noticed using XRD and SEM to characterize them. A correlation between the growth conditions and optical constants is also observed. This helps in selecting the best fitting nanocrystalline structure for the photovoltaic application.

Funding Source: NSF

Titanium incorporated WO3 films for photovoltaic device applications

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Tungsten oxide (WO_3) is an important $5d^0$ transition metal oxide that has been intensively studied due to its interesting electronic and optoelectronic properties and applications as a chromogenic material. WO_3 films and optical coatings are promising contenders to replace indium-tin oxides (ITO) as the transparent conducting oxide in photovoltaic devices as the science community moves toward more abundant resources. It has been demonstrated that the contribution of titanium (Ti)-doping may alter the electronic structure of the oxide in order to benefit the properties and device performance. For the present work, we are focusing on Ti-doping effects into WO_3 films for potential transparent conductive oxides. Ti-doped WO_3 films were grown through radio frequency (RF) magnetron sputtering by varying various growth parameters. The Ti-doped WO_3 films are grown by co-sputter deposition of W and Ti metals at various properties, while the pure W films were grown by sputter deposition. In this case WO_3 films were examined by X-ray Diffraction (XRD) to characterize the crystalline structure. The same procedure was used to examine the effects when Ti is incorporated into WO_3. Another technique used to compare the microstructure of pure WO_3 and Ti-doped WO_3 films was the Raman Spectroscopy. This was used to measure the Raman shift of the two films. In our project, our main focus is on measuring the improvements of the electrical and optical properties Ti has on WO_3 films, while being able to maintain the same crystal structure for the Ti-doped WO_3 films as the WO_3 Films.

Funding Source: National Science Foundation

Recommended Citation:
Lopez , Gabriel ; Vargas , Mirella ; Rubio , Ernesto ; Ramana , Chintalapalle . "Titanium incorporated WO3 films for photovoltaic device applications" (2014). COURI Symposium Abstracts, Spring 2014, ID= 386

Hybrid material design for cryogenic fuel tanks

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Developments in material science and the study of new material properties have allowed engineers to consider the use of unconventional hybrid materials in their designs. Hybrid materials have been known to provide good strength-to-weight ratios, improved thermal and mechanical properties, and many other desirable aspects which are obtained through the combination of the constituent materials. The application of these hybrid materials in cryogenic propellant tanks creates the potential to counterbalance the effect of the thermal shock which is originated due to the high thermal gradient in existence across the walls of such tanks.

Accurate determination of the material properties at its various hierarchical levels is of great relevance to this project. For this reason, micro-scale and tow properties were obtained by the use of the Concentric Cylinder Model approach. Computational models which simulated the characteristics of a textile composite were created and studied using finite element (FE) based analysis. In addition, hybrid composite sheets were manufactured through the Vacuum Assisted Resin Transfer Molding (VARTM) process in order to conduct tensile testing on them.

The use of layers of fabric with different properties accounting for varying thermal expansions and stress distributions within the propellant tank leans the structural engineering towards smart design of the tank's material. It is expected that results obtained from these models, as well as information gathered from manufactured samples, will determine the parameters to optimize the hybrid material composed of Kevlar and carbon fiber.

Funding Source: Campus Office for Undergraduate Research Initiatives

Recommended Citation:
Melendez , Jose ; Islam , Md ; Prabhakar , Pavana . "Hybrid material design for cryogenic fuel tanks" (2014). COURI Symposium Abstracts, Spring 2014, ID= 372

Unsupported NiMoS2 and NiMnMoS2 catalysts prepared by hydrothermal decomposition of ammonium thiomolybdates for hydrogenation of cyclohexene

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The catalytic hydrogenation of aromatic compounds has been restricted in industry to the use of noble metals, which are easily poisoned by the sulfur present in the crude oil feedstock. This study shows an alternative economical synthesis of $NiMoS_2$ and $NiMnMoS_2$ catalysts as a replacement for noble metals in the liquid-phase cyclohexene hydrogenation reaction. Experimental data obtained through the Liquid Hourly Space Velocity (LHSV) method demonstrated that $NiMoS_2$ displays similar catalytic selectivity for sulfur in comparison to the commercial catalyst used. The $NiMoS_2$ and $NiMnMoS_2$ catalysts also showed a greater viscosity index than the commercial catalyst but less aromatic saturation activity at similar operating conditions. However, increasing the system's pressure and/or hydrogen flow improved the saturation activity of this catalyst. These data suggest the possibility of using $NiMoS_2$ for hydrodesulfurization and lube oil applications. Our next step is to use the Brunauer, Emmett, Teller (BET) method, x-ray diffraction, and scanning electron microscopy to determine the structural properties responsible for the catalytic functionality of the materials, thus exploiting modifications that can improve the catalysts.

Funding Source: RISE

Investigation of tungsten doped gallium oxide for high temperature oxygen sensors

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To improve energy conversion processes, oxygen gas sensors are needed with a high efficiency under extreme environments. A promising material capable to tolerate high temperatures and highly sensitive to oxygen without changing its most stable phase (-phase) is gallium oxide (Ga_2O_3). The present work focuses on doping this oxide material in order to improve its sensitivity without changing its crystal structure. Tungsten (W)-doped Ga_2O_3 films were fabricated using co-sputtering deposition. The target materials employed for sputtering were 99.9% W and Ga_2O_3. The sputtering power for the Ga_2O_3-target was kept constant (100 W) while varying the sputtering-power for the W-target in the range of 50-100 W. The purpose of variable sputtering power is to produce materials with variable W concentration. The samples were deposited onto silicon (Si) and sapphire substrates. Substrate temperature was varied from 500 to 800 ^{o}C to understand the effect of substrate temperature on the structure and properties of the deposited films. Crystal structure and surface morphological characteristics of the grown films were evaluated using X-ray diffraction (XRD) and scanning electron microscopy (SEM). The analyses indicates the formation of stable -phase of Ga_2O_3 in all the films.

Funding Source: Department of Energy

Developing an inspection protocol for automatic feedback control in electron beam melting

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Fabrication by electron beam melting (EBM) is evaluated on the basis of prevalent build defects and exploration of appropriate solutions for quality control purposes using infrared (IR) imaging. A FLIR SC645 camera has been installed in an Arcam A2 EBM system at the W.M. Keck Center for 3D Innovation that has been used to detect manufacturing anomalies through the acquisition of thermal images from the additive process. For this project, data captured by the IR camera in previous experiments is being used as input data and compared to the defect database to detect and classify errors. The performance of such defects included the study of un-melted powder, porosity, temperature anomalies, part deformation and improper raking. An algorithm was developed to automate defect detection along with corrective control for the improvisation of part quality and performance. This will then be used to develop, prescribe, and execute an automatic solution and log the corrective action.

Funding Source: W.M Keck Center for 3D Innovation , LSAMP

Recommended Citation:
Montes , Jessica ; Mendoza , Heimdall ; Gaytan , Sara ; Mireles , Jorge ; Espalin , David ; Wicker , Ryan . "Developing an inspection protocol for automatic feedback control in electron beam melting " (2014). COURI Symposium Abstracts, Spring 2014, ID= 318

Fabrication and characterization of tungsten films made by sputter-deposition

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Our research team is involved with fabrication and characterization of intrinsic and doped tungsten oxide films for application in energy related technologies. This study was conducted to obtain baseline for the preparation and property evaluation of pure tungsten (W) films, so that a database is available for comparison of the W-based compounds grown by sputtering. Pure tungsten metallic (W) thin films were fabricated using the radio frequency physical vapor deposition technique with varying sputtering pressure and time of deposition. Scanning electron microscopy (SEM) was used to determine the morphology evolution of W films. It was found that film crystallization is reduced and amorphization is induced with increased sputtering pressures. X-ray diffraction (XRD) analysis indicate that the crystal structure of the W films can be stabilized either in or phases, which can be tailored with variation of the sputtering pressure. The electrical conductivity and mechanical properties of the grown W films were also determined.

Funding Source: National Science Security Consortium, National Nuclear Security Administration

Recommended Citation:
Moreno Tarango , Adbeel ; Martinez , Gustavo ; Ramana , Chintalapalle . "Fabrication and characterization of tungsten films made by sputter-deposition" (2014). COURI Symposium Abstracts, Spring 2014, ID= 383

Developing a prosthetic device to facilitate mobility in the developing world

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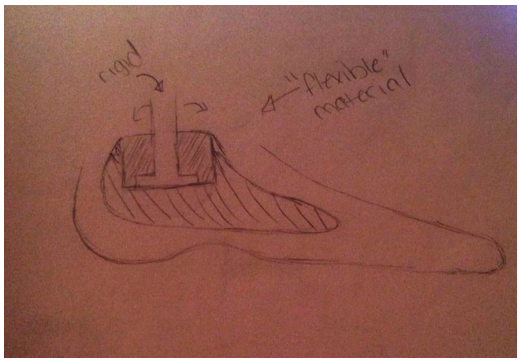
Between 3 million and 11 million amputees are in need of prostheses. Of these amputees, the majority reside in developing countries. Prosthetic ankles can facilitate the mobility of an amputee on uneven terrain and reduce the labor of a prosthetic foot. In order to design a prosthetic ankle, the patient's activity level, durability of mechanism, cosmetic appeal, and cost should be taken into consideration. The first step in this procedure is to review available literature on prosthetic ankles and prosthetic feet. After having acquired knowledge from such resources, then the next step is to begin designing a prototype, then build it. LIMBS, a non-profit organization has produced prosthetic devices for people in developing nations. LIMBS is currently working with a prosthetic foot called the Niagara Foot®. This foot provides a limited amount flexibility, so when an individual steps on any object that is on the pathway, the individual steps on the side of the foot and the prosthesis cannot bend. It is crucial for the prosthetic ankles to provide amputees with stability and facilitate walking because their living conditions include high levels of activity. One way of providing stability is encasing flexible material inside a rigid housing. This allows the device to move in a circular motion. When the prosthetic device moves in a circular motion, it allows the foot to have the desired flexibility and allows the amputee to walk with much more comfort and ease.



Recommended Citation:
Natera , Daniela ; Nystrom , Aaron ; Gonzalez , Roger . "Developing a prosthetic device to facilitate mobility in the developing world" (2014). COURI Symposium Abstracts, Spring 2014, ID= 352

Study of Cd and Te diffusivities on CdS and SiO2 by atomistic simulations

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Nanoscale selective-area growth is one method that is being studied to reduce the defect density in CdTe/CdS heterostructure. In this method, CdTe is deposited on a SiO_2/CdS/SnO/glass substrate in which the SiO_2 is nanopatterned with an array of holes. This allows the CdTe to selective deposit on the CdS but not the SiO_2. This is presumably due to the larger surface diffusion length (diffusivity) of Cd (and Te) adatoms on SiO_2 compared to on CdS. This hypothesis is being studied by solving the continuity equation, using appropriate boundary conditions for a patterned surface, and applying distinct Cd and Te diffusivities. However, the diffusivities of Cd and Te are not well known. Molecular dynamics (MD) can be used to visualize the motion of individual atoms during simulated growth and therefore calculate the diffusion length of Cd and Te on SiO_2 and CdS at various temperatures. In this paper, a method to obtain the diffusivity of the Cd and Te adatoms on both CdS and SiO_2 substrates at different environments by molecular dynamics simulations is presented. An interatomic potential is used to determine the repulsive and attractive forces between atoms as a function of distance between atoms, temperature, and time. Due to the large number of atoms and corresponding equations that need to be solved during crystal growth simulation, super computers are used to obtain results within reasonable time frames. In this study, the Large-Scale Atomic/Molecular Massively Parallel Simulator LAMMPS molecular dynamics program was used to perform the deposition simulation.

Funding Source: NSF/PREM: DMR-1205302, NSF: CNS-1059430, DOE/BRIDGE: DE-EE0005958, and NSF: CNS-1059430

Charge transfer excited states of complexes of ZnTPP with dye-attached fullerenes

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Organic photovoltaics (OPV) are prevalent in research as they exhibit high potential for flexible and cheaper solar cells. The fullerene or fullerene derivatives such as [6,6]-phenyl-C61-butyric acid methyl ester (PCBM) are used as electron acceptors in the bulk heterojunction type solar cells. Often, functionalization of fullerenes is used to achieve optimal separation between the frontier molecular orbitals of the donor and acceptor molecules. Another purpose of such functionalization is to increase the absorption range of the active materials which can lead to higher photocurrent. Recently, one group of dye-attached fullerenes has been synthesized. We carried out a computational study on the electronic structure and charge transfer excited states of such dye-attached fullerenes in conjunction with Zinc-tetraphenyl porpohyrin (ZnTPP). Our calculations are done using density functional theory at the all-electron generalized gradient level. We study two different dye-attached fullerenes and compare their charge transfer excited states in a complex with ZnTPP.

Funding Source: NSF

An exploratory analysis of agent characteristics

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We describe a study in which we create a taxonomy for embodied conversational agents (ECAs) and how it could be applied to create and improve future ECAs. There have been different agent taxonomy proposals; however, they work only under a specific context, usually for agents with a specific purpose or task, and have not been used to evaluate existing agents. Our approach, in contrast, was to create a qualitative and quantitative rubric by evaluating the characteristics that have made existing agents successful or infamous. Our rubric was based on each agent's visual appearance, verbal and non-verbal behaviors, and interaction types, such as body language, realism, non-verbal reactions, verbal communications, etc. We then assigned weights to the most important capabilities and compared different representative ECAs across time. This rubric can be used as a guideline for developing and evaluating ECAs, and can help developers focus in specific features or requirements while maintaining an overall best-case scenario for ECA appearance and functionality.

Recommended Citation:
Rayon , Alex ; Camacho , Adriana ; Novick , David . "An exploratory analysis of agent characteristics" (2014). COURI Symposium Abstracts, Spring 2014, ID= 347

Fabrication and testing of wireless temperature sensor for energy systems aplications

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This study focuses primarily on the production of a signal receiver that is part of novel, low cost, self-powered, wireless temperature sensor. The receiver is composed of a Hall Effect sensor that is tested by sensing the magnetic field produced by a thermoelectric ceramic passing current through a 100 turn coil in a controlled distance. The temperature gradient and voltage relationship was obtained as a result of preliminary testing. The sensor was also tested for magnetic field strength loss when materials were blocking the signal. The materials tested were aluminum, steel alloy (magnetized) and stainless steel. The current was controlled through a power supply and the tests ranged from 0A to 4A. Test results display no signal interruption when aluminum and stainless steel are present but the magnetized steel does inhibit signal loss. Different distances were tested for the magnetized steel to observe the behavior. The signal is still discernible at 4 times the distance the other material where there was not signal loss, thus making the device still applicable in such situations.

Funding Source: Department of Energy under award DE-FOA-0000788 Project Manager Briggs White

Recommended Citation:
Sandoval Vazquez , Salvador ; Sarker , MD Rashedul ; Love , Norman ; Lin , Yirong . "Fabrication and testing of wireless temperature sensor for energy systems aplications" (2014). COURI Symposium Abstracts, Spring 2014, ID= 368

Performance optimization of high performance computing applications via PerfExpert

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As the complexity of High Performance Computing (HPC) systems increases, so does the level of difficulty of the challenges associated with performance optimization. This is particularly true for highly parallel applications for which program optimization has a significant effect on the total time it takes to execute a program. Unfortunately, to effectively optimize a program requires extensive knowledge about the architecture of the system that is running the program and the tools that can be used to collect performance data. For most programmers, this can be an overwhelming task.

An HPC performance evaluation tool called PerfExpert was created to ameliorate this problem. The tool analyzes a user-specified application and employs a sophisticated analysis engine to identify performance bottlenecks. Upon doing so, the tool generates recommended optimizations that the user can implement to address these bottlenecks, which, ideally, will result in a decrease in program execution time.

The purpose of this project is to qualitatively evaluate the ease-of-use of PerfExpert, quantitatively evaluate the performance effect of PerfExpert-recommended optimizations, and provide constructive feedback to PerfExpert developers. In order to conduct this case study, we used a simplified HPC application known as LULESH, which has been optimized by experts for a number of different architectures. Starting with the unoptimized reference code, we produced different versions that were optimized by implementing PerfExpert-recommended optimizations. To quantify and evaluate the effects these optimizations on program execution time and explain the reasons for these effects, we used execution-time measurements and performance event data.

Funding Source: National Science Foundation, Army High Performance Computing Center (through Stanford University)

Recommended Citation:
Shaw , Garrett ; Gallardo , Esthela ; Teller , Patricia . "Performance optimization of high performance computing applications via PerfExpert" (2014). COURI Symposium Abstracts, Spring 2014, ID= 400

Orientational dependence of charge transfer excitation energy in tetracene-C60 and rubrene-C60 complexes

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One of the crucial quantities that influences the performance of an organic photovoltaic device is the open-circuit voltage. The open-circuit voltage depends on the charge transfer excitation energy between the electron donor and acceptor moities which form the active material. In this work we present our calculations on the charge transfer excitation energies of tetracene-C60 and rubrene-C60 complexes which were studied experimentally recently. Bilayers of the acenes and the C60 molecules formed the active material in the experimental devices. Moreover, the charge transfer energies were directly evaluated, which provides us an opportunity to directly compare our calculated electronic structure with experiment. In this work we use our in-house methodology called perturbative delta-self-consistent-field method to calculate the charge transfer excitation energy within the density functional theory framework. The tetracene and rubrene molecules have the same backbone consisting of four fused carbon rings. The rubrene has four phenyl rings, which in effect reduces its coupling with the acceptor molecule. We present the electronic structure of the two complexes in face-on and side-on orientations similar to those used in the experimental device setup.

Funding Source: NSF, PREM

Recommended Citation:
Sikorski , Ember ; Zope , Rajendra ; Basurto , Luis ; Baruah , Tunna . "Orientational dependence of charge transfer excitation energy in tetracene-C60 and rubrene-C60 complexes" (2014). COURI Symposium Abstracts, Spring 2014, ID= 335

Semantic-enhancement of a content management system: Data integration from an external source

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Web content management systems provide interfaces that enable users to share and access information on the Web. Many content management systems are beginning to incorporate semantic capabilities into their frameworks in order to share and combine data more easily. Unfortunately, related semantic data is often distributed over the Web, and, as it is structured for machine understanding, is not meant to be understandable to humans. The purpose of this project is to integrate information from multiple Web sources, in particular, enhance the information captured on a content management system with semantic information available over the Web and make the data understandable to humans. This work is being implemented using a Drupal[1] web server that utilizes RESTful[2] web services to collect RDF[3] about group members and their research contributions from a server at the Cyber-ShARE Research Center. Through an RDF triple store (Virtuoso[4]) the enhanced Drupal server is able to support the integration and exchange of semantic data from different sources; not limiting users of Drupal to the predefined entities defined on the content management system. Moreover, a simple algorithm is used to create human views of the imported semantic data. The Drupal server exhibits the benefits of our approach on incorporating semantic data within a content management system; it supports information integration and exchange of distributed research information found over the Web. Future steps include capturing semantic data from other sources and integrating it with group member information.

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[1] https://www.drupal.org

[2] https://www.ibm.com/developerworks/webservices/library/ws-restful

[3] https://www.w3.org/RDF

[4] https://virtuoso.openlinksw.com

Recommended Citation:
Valtierra , Karina ; Gandara , Aida ; Villanueva-Rosales , Natalia . "Semantic-enhancement of a content management system: Data integration from an external source" (2014). COURI Symposium Abstracts, Spring 2014, ID= 349

Selective-area growth of CdTe/ZnTe on micro patterned- SiO2/CdS/ITO/glass substrates for record breaking solar cells

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[3] *Sandia National Laboratories, Sandia National Laboratories.*

One way to reduce the defect densities in CdTe solar cells is to add a ZnTe layer as a buffer between the CdTe and the CdS layers. Furthermore, implementing micro and nano- enabled pseudomorphic selective growth of $Cd_xZn_{(1-x)}Te$ will increase the efficiency of CdTe modules by increasing the open circuit voltage. In this work, we report the uniform selective-area growth of CdTe/ZnTe islands on micro patterned-SiO_2/CdS/ITO/glass wafers using a multisource close-spaced sublimation reactor.The ZnTe and CdTe deposited selectively only on the CdS and not on the SiO_2 due to a much larger surface diffusion length on the SiO_2. The temperature used for selective growth of ZnTe was 665 C and 550 C for the substrate,while CdTe used 565 C and 540 C for the source and substrate, respectively. The ZnTe was deposited first, followed by the CdTe. However, in one case vacuum was broken between growths to analyze the ZnTe via SEM prior to depositing CdTe: we called this the interrupted process. In a second case, ZnTe and CdTe were deposited in a single run without breaking vacuum: we called this the uninterrupted process. Uniform growth selectivity was observed with SEM in both cases. Furthermore, X- ray diffraction was performed on both samples confirming very little intermixing between the CdTe and ZnTe for the interrupted process. However, the XRD trace from the uninterrupted process confirmed continuous intermixing between ZnTe and CdTe, resulting in a graded $Cd_xZn_{(1-x)}Te$.

Funding Source: National Science Foundation, Department of Energy, Sandia National Laboratories

Recommended Citation:
Vidaña , Aldo ; Marrufo , Damian ; Aguirre , Brandon ; Aguirre , Rodolfo ; Zubia , David ; McClure , John ; Cruz-Campa , Jose . "Selective-area growth of CdTe/ZnTe on micro patterned- SiO2/CdS/ITO/glass substrates for record breaking solar cells" (2014). COURI Symposium Abstracts, Spring 2014, ID= 398

Environmental & Geological Sciences

Interannual differences in tundra microtopography is correlated with phenological variation of vegetation

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Climate change in the Arctic is expected to alter a wide array of ecosystem parameters including vegetation, surface hydrology, depth of thaw, permafrost, and climate. The interactions between vegetation, soil moisture and microtopography are key controls of ecosystem function, yet the spatiotemporal dynamics of these factors have rarely been examined in unison. This study utilizes data from an NSF-funded Arctic Observing Network site situated near Barrow in northern-most Alaska where multi-scale measures of tundra vegetation community dynamics, plant to landscape phenology, and thaw depth are being made. Specifically, this study examines how surface microtopography measured with high spatial resolution terrestrial Light Detection and Ranging (LiDAR) varies between years and how this variability correlates with variability in vegetation phenology derived from greenness indices measured with digital Kite Aerial Photography (KAP). More than 2 million LiDAR points were used to derive a Digital Elevation Model (DEM) of the 2 by 50 meter study area for surveys in 2011 and 2012. ArcGIS software was used to interpolate the change in landscape vertical position between sampling times. Differences between DEMs were compared to inter-annual differences in landscape phenology that were superimposed over the same rasterized DEM's. Findings from this study have implications for understanding ecosystem processes that causes inter annual variability and long term change trends in low resolution satellite imagery that is useful for examining change over the entire circumarctic.

Recommended Citation:
Armendariz Jr , Raul ; Vargas , Sergio ; Cody , Ryan ; Melendez , Mayra ; Tweedie , Craig . "Interannual differences in tundra microtopography is correlated with phenological variation of vegetation " (2014). COURI Symposium Abstracts, Spring 2014, ID= 401

Hydrological and geophysical investigation of the effect of surface and groundwater flow on the El Paso Keystone Wetlands

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Wetlands play a critical role in maintaining the watershed and provide crucial habitats for diverse plant and animal species. The Keystone Wetlands in El Paso, Texas, is a 4,000 year old archaic wetland that is one of the last of its kind found within the El Paso-Ciudad Juarez region. The Keystone Wetland is known to be recharged through surface water. Based on the observed behavior of water pooling patterns after heavy rainfall, it is suspected that other factors may be involved in recharging, i.e., groundwater flow, spring water. The aim of the current project is to investigate how the flow of water into Keystone Wetlands is controlled by surface flow and possibly these other sources. It is hypothesized that there may be delayed underground water flow from the arroyos in surrounding areas following rainstorms that may be partially responsible for recharging the wetlands The geophysical method used to investigate the hypothesis was the collection of electrical conductivity measurements. Extant raw data on electrical conductivity data were also analyzed in order to determine geophysical trends. Preliminary findings show that the electrical conductivity of the wetlands site is generally highest in the northern portion of the site and lowest in the southern portion. In an area of land adjacent to the wetlands, the lowest electrical conductivity levels occurred within an arroyo. The levels rose as distance from the arroyo increased. This phenomenon may related to grain size variations, with coarser material found in the arroyos and finer grained material in surrounding regions.

Recommended Citation:
Armijos , Samira ; Doser , Diane . "Hydrological and geophysical investigation of the effect of surface and groundwater flow on the El Paso Keystone Wetlands" (2014). COURI Symposium Abstracts, Spring 2014, ID= 343

Comparing orthopteran diversity between perennial and ephemeral water sources and open desert on Indio Mountains Research Station, Hudspeth County, Texas

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The Chihuahuan Desert is the largest and least studied desert in North America. Biodiversity is relatively high, but ecological patterns are poorly understood. An ecogeographic analysis of a grasshopper survey was conducted on Indio Mountains Research Station (IMRS) at seven separate Chihuahuan Desert sites from June through December 2013. Four sites were ephemeral water sources (earthen tanks), one was a perennial water source (Squaw Spring), and two were open desert sites. A total of 11 grasshopper species were identified. The most species rich sites were Lone Mesquite, Squaw Spring, and Peccary tank, each containing six grasshopper species. A UPGMA dendrogram (Unweighted Pair Group Method with Arithmetic Mean) generated from Simpson's Similarity Coefficient (SC) showed Peccary Tank and Squaw Spring, both wetland sites, to be the most similar (SC = .83). All wetland sites clustered together (SC = .57) when compared to open desert sites (Lone Mesquite and the Y), which as predicted clustered highly with each other (SC = .80). The cluster containing all wetland sites coupled to the open desert cluster at a SC value of .46. Of all wetland sites, Mesquite Tank was the most distinctive (SC = .53). Also reported are seasonal trends in activity of grasshoppers due to variation in temperature; climatic data was take from a central weather station on IMRS. This preliminary data will be used to supplement a future extended ecogeographic analysis of orthopterans occurring on IMRS.

Funding Source: NSF

Comparison of recapture rates between parthenogenetic Aspidoscelis tesselata and gonochoristic Aspidoscelis marmorata (Squamata: Teiidae) on Indio Mountains Research Station, Hudspeth County, Texas, USA

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Recapture studies provide general information on a species' biology, such as home range, growth, reproduction, and longevity. This study was conducted to determine if there is a significant variance in recapture rates between syntopic parthenogenetic and gonochoristic whiptail lizards: *Aspidoscelis tesselata* and *A. marmorata*, respectively. Because of potential distinctions between the two species, such as size, reproductive potential, foraging behavior, and wariness, it was hypothesized that their recapture rates will be significantly different. Lizards were captured on UTEP's Indio Mountains Research Station, Hudspeth County, Texas. Prospect Pits and Ranch House arrays were surveyed from 2011 through 2013, using 87 pitfall traps. For future identification, lizards were given unique toe clip numbers involving one or two digits. In 2011, 156 lizards were sampled, with 38 recaptures; 30 of 84 were *A. marmorata* and 8 of 72 were *A. tesselata*. In 2012, 127 lizards were captured, with 42 recaptures; 37 of 58 were *A. marmorata* and five of 69 were *A. tesselata*. In 2013, 99 lizards were sampled, with 27 recaptures; 24 of 58 were *A. marmorata* and three of 41 were *A. tesselata.* Results indicate that *A. marmorata* had a significantly higher recapture rate (200/91= 46%) than *A. tesselata* (182/16 = 9%), which validates the hypothesis that there are differences between the two species. Result implications allows for providing useful facts for other researchers to pursue projects on the ecological and physiological causes for the differences in recapture rates between these two whiptail species.

Funding Source: UTEP Undergraduate Research Mentoring (URM) Program (National Science Foundation DBI-0933979)

Recommended Citation:
Benson , Allyson ; Franco , Gabriela ; Lukefahr , William ; Johnson , Jerry . "Comparison of recapture rates between parthenogenetic Aspidoscelis tesselata and gonochoristic Aspidoscelis marmorata (Squamata: Teiidae) on Indio Mountains Research Station, Hudspeth County, Texas, USA" (2014). COURI Symposium Abstracts, Spring 2014, ID= 313

Molecular taxonomy and ecology of the crab hole mosquito (Culicidae: Deinocerites) in Panama

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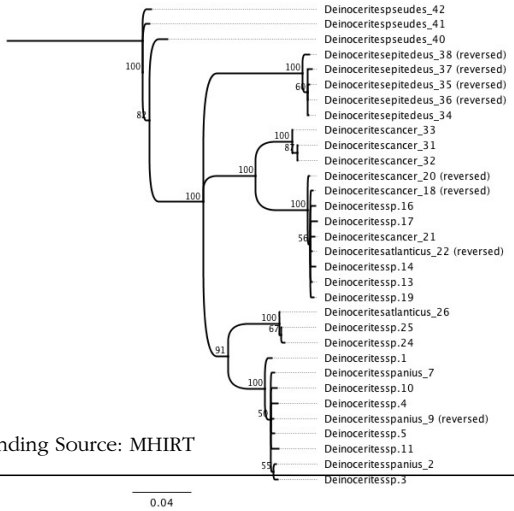
Deinocerites, the crab hole mosquito, inhabits the manglars of the Americas. In the future, *Deinocerites* could become propagator of diseases due to deforestation. Previous studies demonstrate it is an efficient vector of pathogens that affect humans. This six week pilot study looked at the ecology and the genetic taxonomy of the *Deinocerites* mosquitoes in Panama. One of the aims of the study was to determine if the species morphologically identified by Adames' 1971 review belong molecularly different taxa. The second aim was to identify the relationships between the number of *Deinocerites* larvae in crab holes with abiotic factors (pH and temperature). The study was based on two hypotheses: (1) The phylogenetic relationships of *Deinocerites* samples based on COI barcode sequence would differ from those created using morphological differences; and (2) There would be a relationship between the number of larvae collected and the abiotic factors. Adult mosquitoes were collected from five sites in Panama and morphologically identified using Adames' 1971 review. A phylogenetic tree was constructed using Geneious software using 2% divergence. Larvae and pupae from crab holes were collected from three different sites in Bocas del Toro, Panama. A possibly molecularly different taxa in the Cancer group was identified. The data revealed no relationship between the number of larvae and the abiotic factors measured. However, a larger sample size and different research approach is needed to verify the results. This small scale study will contribute to the review by correlating the morphological key and distribution map to the genetic taxonomy of *Deinocerites*.



Funding Source: MHIRT

Recommended Citation:
Betancourt , Angie ; Loaiza , Jose . "Molecular taxonomy and ecology of the crab hole mosquito (Culicidae: Deinocerites) in Panama" (2014). COURI Symposium Abstracts, Spring 2014, ID= 340

Application of refraction seismology techniques and simple Bouguer corrections to gravity readings to interpret the subsurface geologic structures of southwestern El Paso.

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The demolition of the Asarco smokestack and of El Paso City Hall in April 2013 provided a unique opportunity to use these events as seismic sources. Forty-two seismic sensors were placed across the UTEP campus and surrounding regions to collect data that could be used to interpret the subsurface geologic structures of southwestern El Paso. These seismic data, coupled with forty-four gravity readings in the same region, were used to determine changes in the depth to bedrock near UTEP and the possible composition of bedrock within the region. Preliminary results show velocities for the bedrock ranging from 4051 m/s to 5408 m/s and a depth to bedrock ranging from 600 m to 656 m. Garner's Relation can be used to provide information about the lithology from interval velocities obtained from the seismic data such as the density of the rock units, and composition. A Simple Bouguer correction was used with the gravity readings in the production of a gravity map. The gravity map shows an increase in intensity in a westward direction. A cross-section can be obtained from the gravity readings, providing more information about the lithology in the region such as depth to bedrock, density of rock units, composition and geologic structures. The seismic data and gravity maps compliment the geology found at the surface in southwestern El Paso and have expanded the knowledge of the subsurface geology in the region.

Recommended Citation:
Castro , Joel ; Doser , Diane . "Application of refraction seismology techniques and simple Bouguer corrections to gravity readings to interpret the subsurface geologic structures of southwestern El Paso. " (2014). COURI Symposium Abstracts, Spring 2014, ID= 355

Climate change and genetic variation in a tropical reef dwelling crustacean, Mysidium gracile

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Genetic variation is essential for populations to respond to changing environments. Seawater temperatures are rising while pH is dropping. Thus, there is much concern in the ability of reef-associated organisms to withstand these changes and overall coral reef health. The mysid Mysidium gracile commonly aggregates into swarms near reefs. They play a vital role in reef systems by occupying an important intermediate level of marine food webs. The goal of this study is to determine levels of genetic variation in Carribean M. gracile populations. Mysids from 15 swarms were collected and preserved for genetic analysis. The DNA barcoding gene, COI, was amplified and sequenced for 25 mysids representing 4 swarms. An uncorrected genetic distance (p) matrix was constructed using PAUP, a computational phylogenetics program for inferring evolutionary phylogenies. Genetic variation among swarms varied from 4-33% and distances within swarms ranged from 0-25%. Mysids comprised four clades based on Neighbor Joining analyses. The clade composed of mysids from Guanica had very little genetic variation, which was unexpected. Only a small number of individuals have been sequenced so far. Additional individuals representing swarms isolated from three other islands are in the process of being characterized. Overall, these results show that there is a strong genetic variation with and among mysid swarms, thus granting them the ability to adapt to their changing environment.

Recommended Citation:
Chapina , Rosaura ; Ramos , Jennifer ; Walsh , Elizabeth . "Climate change and genetic variation in a tropical reef dwelling crustacean, Mysidium gracile" (2014). COURI Symposium Abstracts, Spring 2014, ID= 403

Geophysical analysis of seismicity in the Matanuska-Susitna Valley region near Anchorage, Alaska

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The Matanuska-Susitna (Mat-Su) Valley region of south-central Alaska contains the Castle Mountain Fault (CMF), as well as several other buried faults/folds that currently exhibit seismicity. This region of Alaska is covered with dense vegetation and many swamps, which makes it difficult to find geological evidence of recent active structures besides the Castle Mountain fault. The eastern segment of the Castle Mountain Fault is seismically active (site of the magnitude 5.7 Sutton earthquake in 1984), but shows no evidence of surficial Holocene movement. In contrast, the western segment of the fault is not seismically active, although Holocene surface offsets show it is capable of producing large magnitude earthquakes (~6-7.0). Population in the Mat-Su Valley has grown as space within the city limits of Anchorage, Alaska (<40km), is limited. This makes it important to determine the location of seismically active features that could pose hazards to the growing community. We use new gravity data (collected between 2009 and 2013) in conjunction with existing gravity and magnetic data to help determine subsurface geologic structures that may control recent seismicity.

Recommended Citation:
DesVoignes , Chloe ; Doser , Diane . "Geophysical analysis of seismicity in the Matanuska-Susitna Valley region near Anchorage, Alaska " (2014). COURI Symposium Abstracts, Spring 2014, ID= 293

Systematics, phylogeography and species discovery in the Australian angiosperm genus Gonocarpus (Haloragaceae)

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The angiosperm genus *Gonocarpus* (Haloragaceae) is a relatively poorly known group with high levels of local endemism throughout its range. It occurs primarily in Australia (34/37 spp.) with six species ranging into New Zealand and/or Asia. Much of *Gonocarpus* diversity is found in the southwest Western Australia International Biodiversity Hotspot where several species are considered rare or of priority concern. The most recent taxonomic treatment for the genus was based on morphology only and included very few specimens as collections were limited until recently. This genus also has a high level of morphological plasticity and several species are described as highly variable. Here we use a molecular phylogenetic approach to aid in our understanding of species limits, evolutionary relationships and biogeographic origins. DNA data was collected from the nrDNA internal transcribed spacer (ITS) region for 91 accessions. Chloroplast DNA (cpDNA) data was collected from intron region *trn*L – *trn*F for 82 accessions for comparative analyses. Sequences were analyzed to construct a phylogenetic hypothesis, determine times of divergence, and infer ancestral distribution. Results from phylogenetic analyses of both ITS and cpDNA show high molecular variability among species and have uncovered cryptic species in southwest Western Australia. Analyses support an origin of the genus in Western Australia approximately 50 mya with dispersal east and multiple events leading to dispersal into Asia. These results will be used to help define new species of *Gonocarpus,* inform conservation efforts and provide further evidence regarding phylogeographic patterns in Australia.

Funding Source: National Science Foundation, Department of Environment and Conservation - Western Australia

Recommended Citation:
Garcia , Michelle ; Moody , Michael . "Systematics, phylogeography and species discovery in the Australian angiosperm genus Gonocarpus (Haloragaceae)" (2014). COURI Symposium Abstracts, Spring 2014, ID= 305

Using sequential extraction and mass spectrometer to determine U distribution in soils from Basse-Terre, Guadeloupe: Implications for understanding chemical weathering in a tropical climate

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Geochemical applications provide useful information about origin, mobilization and transport of trace metals in soils. We can infer soil formation rate by observing how Uranium (U) isotopes fractionate during chemical weathering – a natural process transforming rocks to soils. This is done by first finding where U is located within the soil and then how it is leached or added to the soil. For this project, we will determine the distribution of U in soils from varying depths in a soil profile from French Guadeloupe using a sequential extraction procedure followed by column chemistry and finally mass spectrometry. For the sequential extraction process we are interested in leaching metals from three different phases of soils: exchangeable, bound to carbonates, and bound to Fe and Mn oxides. We will conduct column chemistry to separate U from the other elements. Using a mass spectrometer we will be able to determine ratios of U isotopes and U concentrations in different U phases of the soils. This project is a step in determining how fast volcanic rocks weather under tropical environments by using samples from French Guadeloupe where the bedrock is composed of andesite and exposed to 1-10 meters of rain per year. Chemical weathering is expected to be very fast. Since formation of soils uses carbon dioxide from the atmosphere, this will help us to understand the carbon cycle on the Earth's surface. This technique can be also applied to investigate environmental issues such as dealing with heavy metal pollution in soils.

Recommended Citation:
Garcia , Sandra ; Ma , Lin ; Sak , Peter ; Buss , Heather ; Brantley , Susan . "Using sequential extraction and mass spectrometer to determine U distribution in soils from Basse-Terre, Guadeloupe: Implications for understanding chemical weathering in a tropical climate" (2014). COURI Symposium Abstracts, Spring 2014, ID= 399

Applications of bioinformatics tools for identification of arsenic detoxification enzymes in rotifers

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Even though arsenic is found naturally, it is prevalent in many water systems due to a variety of anthropogenic activities. Elevated concentrations have shown to not only be toxic to aquatic organisms residing in these waters, but also to humans through contaminated drinking water. In response to this toxicity, organisms have developed detoxification mechanisms and similarities among the pathways are expected. We specifically investigate pathways involved in arsenic resistance. We used bioinformatics approaches to discover and identify genes involved in arsenic metabolism in the euryhaline model rotifer, *Brachionus plicatilis*. Using known pathways identified in other species (e.g., *Loa loa, Ascaris suum, Danio rerio*) we verified these detoxification enzymes in the transcriptome of the bdelliod rotifer *Adenita ricciae*, using Trinotate: Trinity Transcriptome Assembly software. This analysis revealed 15 potential arsenic-associated enzymes including ATPase ASNA1, an arsA homolog in bacteria, and arsenite methyltransferase. Further investigation of ATPase ANA1 through multiple sequence alignment (MAFFT), identification of potential motifs (MEME), and phylogenetic reconstruction (Neighbor-Joining), showed strong conservation among these taxa, including rotifers. The same method was followed for the analysis of arsenite methyltransferase and conservation was also shown. BLAST searches against the EST libraries specific for *B. plicatilis* using confirmed transcripts of *A. ricciae* were performed in order to reference back results. However, they showed little to no significant results. The results obtained will enhance our understanding of the pathways lower trophic level organisms use to metabolically remove arsenic found in waterways.

Recommended Citation:
Jauregui , Edgar ; Hinson , Kayla ; Walsh , Elizabeth . "Applications of bioinformatics tools for identification of arsenic detoxification enzymes in rotifers" (2014). COURI Symposium Abstracts, Spring 2014, ID= 323

Determining soil changes within an alfalfa field using electrical conductivity measurments

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We have collected 8000 EC (electrical conductivity) data points along 16 lines in an alfalfa field located in Socorro, Texas. These data will be used to examine how changes in soil properties affect crop growth. Understanding these soil changes will aid in determining if the soil can be remediated to improve crop yield. For example, a sandy soil may not retain water long enough for the plants to absorb water and proper nutrients. On the other hand, a soil high in clay content may not allow the water to permeate, concentrating water and harmful minerals at the surface. The results of the EC data will be compared with grain size variations observed in soil core samples. The EC instrumentation measures average values of EC at 3 and 6 meters in depth. Our preliminary results show that EC values are higher in the southwestern portion of the field where the alfalfa grows the best. Lower EC values are associated with portions of the field where we have observed water ponding at the surface for long periods of time following irrigation, resulting in poorer crop growth. We hope that the results of the soil core analysis and other geophysical studies we have conducted at the site will help us to understand why regions of the best plant growth are associated with higher EC values. In addition to creating a poster and accompanying figures, lesson plans were created and willbe presented to a group of students taking a course in engineering geology.

Funding Source: NSF

Recommended Citation:
Lucero , Marc ; Doser , Diane . "Determining soil changes within an alfalfa field using electrical conductivity measurments" (2014). COURI Symposium Abstracts, Spring 2014, ID= 345

Wind as dispersal mechanism for aquatic invertebrates in the North American desert southwest

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In desert regions, aquatic habitats are often ephemeral and separated by vast distances. Despite seeming isolation of these systems, aquatic micro-invertebrates can disperse and successfully colonize remote habitats. As wetlands desiccate, sediments containing aquatic invertebrate resting stages are exposed to deflation by wind. Here, we investigate the role of anemochory in dispersing these organisms using two methods: dust sample rehydration and environmental sequencing of dust, sediment, and natural waters from 8 ephemeral wetlands in the Chihuahuan Desert. We collected dust from 14 wind events at 4 sites near El Paso, TX. Dust samples were split for chemical and biological processing, and were rehydrated in artificial hardwater. Invertebrates that hatched were sequenced for the mtDNA COI gene. Wetland water and sediment samples were pooled from each wetland and 3 dust samples; total DNA was extracted and sequenced. In 14 rehydrated dust samples, we found monogonont (6 species) and bdelloid rotifers, gastrotrichs, nematodes, tardigrades, ostraocods, copepods, and branchiopods. Bdelloid rotifers were most common, occurring in 71% of samples. Partial COI sequences show at least 3 species of bdelloids. Nematodes were found in three samples (21%) and gastrotrichs and branchiopods in two (14%). Preliminary analyses of environmental samples show diverse OUT arrays, with <1-12% identified as aquatic invertebrates other than nematodes. Nematodes were prevalent in some sediment and water samples (up to 40%). Of the three dust samples analyzed, sequences for arthropods, nematodes, and rotifers were obtained, but with relatively few representative sequences. Both methods demonstrate regional transport of aquatic invertebrates via wind.

Recommended Citation:
Martin , Maite ; Rivas , Jose ; Hinson , Kayla ; Moody , Michael ; Walsh , Elizabeth . "Wind as dispersal mechanism for aquatic invertebrates in the North American desert southwest" (2014). COURI Symposium Abstracts, Spring 2014, ID= 304

Mapping soil variations using magnetic geophysical methods to determine their effects on crop production

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We are using several geophysical methods, including the magnetic technique, to determine how soil variations are controlling agricultural yields in an alfalfa field in the south-eastern part of El Paso County, Texas. We believe that changes in soil types within the alfalfa field are related to variations in the deposition of sediment by the Rio Grande river system. Differences in grain size within the soils have led to differences in the ability of the soils within the field to hold moisture and salt, which directly impacts crop yields. In other portions of the Rio Grande valley we have found that coarser river sediments are associated with higher amounts of magnetite and produce higher magnetic responses. Therefore we are conducting magnetic susceptibility studies to help determine variations in soil grain size and will correlate these results with other geophysical studies, grain size analysis of soil cores at several sites and continuous soil moisture/salinity/temperature monitoring at the site.

Funding Source: National Science Foundation

Recommended Citation:
Martinez , Isaac ; Doser , Diane . "Mapping soil variations using magnetic geophysical methods to determine their effects on crop production" (2014). COURI Symposium Abstracts, Spring 2014, ID= 326

Assessing the effects of nutrient enrichment in arctic aquatic ecosystems

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As a result of Arctic warming trends, permafrost soils are thawing at lower depths than historic records show, consequently, releasing more nutrients into freshwater ecosystems. This, along with evaporation caused by higher temperatures, has resulted in higher nutrient concentration in Arctic aquatic ecosystems, which has the potential to increase aquatic production. Primary producers in freshwater ecosystems such as phytoplankton and periphyton are typically nutrient limited by nitrogen (N), phosphorus (P) or a combination of (NP), which can be the result of frequent changes by N and P limitation over time. Phytoplankton depends on nutrients from the water column. In order to assess pelagic algae nutrient limitation we completed in situ studies on the Arctic tundra. Water was collected from the water column in three different sites during the summer of 2013. Water was released into 500 ml bottles that were attached to a PVC frame that suspended them 20 cm below the water surface. The nutrient addition treatments consisted of 400 g/L KH_2PO_4 (P), 400 g/L NH_4NO_3 (N), a combination of both (NP) and a control (C). Phytoplankton samples were collected by filtering 500 ml of water through GF/C filters. Results confirmed that pelagic algae are now P or NP co-limited, as opposed to 40 years ago when they were only P-limited. In conclusion the enrichment of nutrients has caused changes in algal community structure. Future studies will look at both warming and nutrient effects in a factorial experimental design.

Recommended Citation:
Olivarez , Yolanda ; Lougheed , Vanessa . "Assessing the effects of nutrient enrichment in arctic aquatic ecosystems" (2014). COURI Symposium Abstracts, Spring 2014, ID= 299

Cryptic speciation in aquatic invertebrates: case study of sessile rotifers

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Aquatic ecosystems and their biodiversity are increasingly being threatened by anthropogenic activities. Moreover much of the diversity of these systems remains unknown due to the fact that traditional methods may not be fully effective in detecting true levels of species diversity. This is especially true for organisms that are morphologically conservative. The phylum Rotifera comprises microscopic invertebrates that are vital components of freshwater communities because they connect microbial life to higher trophic levels. The application of morphological, behavioral, and molecular methods in deciphering species boundaries has led to the detection of cryptic speciation among so-called cosmopolitan species. Here we use molecular methods to detect cryptic speciation in sessile rotifers, genera *Collotheca* and *Limnias*. We compared genetic variation of five *Collotheca ornata* populations to three other species (*C. trilobata, C. campanulata,* and *C. tenuilobata*). For *C. ornata*, cytochrome c oxidase subunit I (COI) mitochondrial gene variation was 0.15-30.1% within populations and 21.2-30.1% among species. We also obtained sequences from six populations of *Limnias ceratophylli*; *L. melicerta* was included as an outgroup. COI showed 0.5-31.9% within species and 18.2-26.7% among species variation. Because variation within species for some populations is equal to that of among species, the number of species of both *Collotheca* and *Limnias* is likely to be underestimated. The results of this study will provide COI DNA barcodes for these two genera. In addition, they give a more accurate account of diversity within phylum Rotifera and provide better biodiversity data for conservation plans for endangered freshwater ecosystems.

Funding Source: National Science Foundation

Recommended Citation:
Preza , Elizabeth ; Kordabacheh , Azar ; Walsh , Elizabeth . "Cryptic speciation in aquatic invertebrates: case study of sessile rotifers" (2014). COURI Symposium Abstracts, Spring 2014, ID= 324

Systematics of African limbless skinks (Squamata: Scincidae) of the genus Melanoseps

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The genus *Melanoseps* (Squamata: Scincidae) consists of eight recognized species of legless skinks found in forested regions of central and eastern Africa, ranging from Cameroon to Mozambique. Fossorial habits of this genus make specimens difficult to obtain for molecular and morphological analyses. In 2011, a specimen classified as *M.* cf. *occidentalis* was collected from Bizombo forest, eastern Democratic Republic of Congo (DRC). Distance between the type locality (Cameroon) of *M. occidentalis* and Bizombo is approximately 2000 kilometers, raising the possibility that the two populations are not conspecific. Moreover, the lowland forests of Cameroon and DRC were separated during the Miocene era, making the hypothesized speciation of *M.* cf. *occidentalis* a possible result of vicariance. We explored systematics of the genus by sequencing the 16S mitochondrial rDNA gene from available specimens of *Melanoseps*, and our phylogeny was constructed with maximum-likelihood criteria with the program RAxML. We also generated high-resolution x-ray computer tomography (CT) images from *M. ater* (*Melanoseps* type species), topotypic *M. occidentalis*, the Bizombo *M.* cf. *occidentalis*, *M. poensis*, and a specimen of *Feylinia currori* (sister group to *Melanoseps).* Although DNA samples from topotypic *M. occidentalis* are unavailable, the Bizombo *M.* cf. *occidentalis* and *M. poensis* samples showed substantial genetic divergences from other *Melanoseps* species and from each other. Preliminary morphological comparisons between CT scans of *M.* cf. *occidentalis* and *M. poensis* show several differences from the type species *M. ater.* Our results suggest that *M.* cf. *occidentalis* and *M. poensis* might represent a different genus from *Melanoseps sensu stricto*.

Recommended Citation:
Rashid , Waleeja ; Medina , Maria ; Stanley , Edward ; Menegon , Michele ; Nguyen , Marie ; Branch , William ; Greenbaum , Eli . "Systematics of African limbless skinks (Squamata: Scincidae) of the genus Melanoseps" (2014). COURI Symposium Abstracts, Spring 2014, ID= 393

Surveillance of mosquitoes for arthropod-borne viruses in El Paso County, Texas

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West Nile virus (WNV) is the only known arthropod-borne virus (arbovirus) currently reported as the cause of human disease in the El Paso and Juarez communities. In 2013, a total of 32 cases, with 9 deaths, were confirmed in El Paso County. The primary vectors of WNV are *Culex* (*Cx.*) mosquitoes, including *Cx. quinquefasciatus* and *Cx. tarsalis* which are found in El Paso and Juarez. We also included *Aedes (Ae.) aegypti* in these surveys, as they are the primary vector of dengue viruses (DENV). Dengue fever (DF) has recently reemerged in communities along the USA-Mexico border raising awareness and the need for surveillance for *Ae. aegypti*. Since 2011, we conducted population density surveys for vector mosquitoes throughout El Paso using carbon dioxide baited CDC light traps and ovi-position traps. In 2013, mosquitoes were collected, identified to species, pooled by species, date and location of collection, and tested for the DENV and WNV in Vero cell culture and with a rapid commercial VEC test. A total of 280 mosquitoes pools were tested for viruses. WNV was isolated from 8 of 111 pools of *Cx. quinquefasciatus*, but not from 79 pools comprised of *Cx. tarsalis* (2 pools were positive for an unknown virus); and DENV was not isolated from 90 pools of *Ae. aegypti* (2 pools were positive for an unknown virus). These findings suggest that *Cx. quinquefasciatus* is the primary vector of WNV and that DENV are not endemic in the El Paso community.

Funding Source: Supported by Public Health Foundation Enterprises Program 2121 – Watts DM (PI)

Recommended Citation:
Soliz , Albert ; Sewell , Lee ; Crews , Celinda ; Palermo , Pedro ; Watts , Douglas . "Surveillance of mosquitoes for arthropod-borne viruses in El Paso County, Texas" (2014). COURI Symposium Abstracts, Spring 2014, ID= 314

Effects of flood irrigation on soil quality in West Texas: another way of how humans are changing the world

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Soil degradation is an issue of high concern world-wide. Every year, many agricultural fields are used for crop cultivation causing nutrients to be withdrawn from the soil. In dry climates, irrigation techniques, such as flood irrigation, take a major toll on soil quality. This method of flooding fields with water loads high amounts of salts into the soil. In the El Paso region, one source of irrigation-water is obtained through the extraction of groundwater. Groundwater in this region contains high amounts of salts. This, combined with high evaporation rates, causes salts to be loaded into the soil and degrades the soil quality after every growing season. Understanding the soil in agricultural fields can provide answers to many problems encountered while farming, as well as prevent any issues with future crops.

Soil samples were gathered from a pecan and alfalfa field in the El Paso region. Using soil leachates, elemental data, soil texture, as well as pH and electro-conductivity data were gathered in order to characterize the soils at both fields. Soil texture data from the alfalfa field helped solve an issue in regards to the lack of alfalfa growth in one part of the field. Elemental data gathered from a pecan field was compared to previous data collected in 2011 in the same field. A current status of the soil was obtained for 2013 which gave an insight to soil degradation from the use of the flood irrigation method being practiced on this field.

Funding Source: COURI

Recommended Citation:
Sosa , Emmanuel ; Garcia , Sandra ; Jin , Lixin . "Effects of flood irrigation on soil quality in West Texas: another way of how humans are changing the world" (2014). COURI Symposium Abstracts, Spring 2014, ID= 407

Systematics of the genus Lygodactylus from Democratic Republic of the Congo

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The dwarf gecko genus *Lygodactylus* currently consists of 62 diurnal species, which are endemic to sub-Saharan Africa, Madagascar and South America. Because the *Lygodactylus* species from Central Africa are poorly known (only one specimen was included in the most comprehensive phylogenetic analysis of the genus), we analyzed 12 samples from Democratic Republic of the Congo (DRC) to understand how they are related to other populations in sub-Saharan Africa. We sequenced the commonly used 16S mitochondrial gene from our samples and combined them with 68 GenBank samples with maximum-likelihood and Bayesian inference optimality criteria in the programs RAxML and MrBayes, respectively. Our results confirmed the monophyly of *Lygodactylus*, and can be used to clarify the relationships between species within the genus. The phylogeny indicated that some samples collected are congruent with recognized species such as *L. angularis heeneni*, *L. capensis* and *L. gutturalis*, whereas some samples from Kinshasa and Katanga may possibly represent undescribed species that warrant further investigation with morphological comparisons to type material. Analyses resulted in 40 clades, three of which represent unknown species. With 37 species recognized in sub-Saharan Africa and only six species known from DRC, there is a strong possibility that *Lygodactylus* diversity is underestimated in Central Africa.

Recommended Citation:
Stewart , Samantha ; Larson , Thornton ; Greenbaum , Eli . "Systematics of the genus Lygodactylus from Democratic Republic of the Congo" (2014). COURI Symposium Abstracts, Spring 2014, ID= 385

The effects of permafrost thaw on long-term nutrient release into Arctic Tundra ponds

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With warming in the Arctic, more nutrients are being released from thawing permafrost into Arctic aquatic ecosystems. The levels of nutrient release over time are largely unknown. With higher nutrient levels in Arctic ponds, microbial activity as well as lower trophic levels may be significantly altered. To examine long-term nutrient release from thawing permafrost, and the role of microbial activity in this release, permafrost cores collected from Barrow, Alaska were incubated for 8 weeks in a cold room at two different temperatures (7 C and 15 C) in beakers containing either DI water alone or DI and formaldehyde. Water samples were collected at 24, 48, 72, 168, 336, 672 and 1776 (8wks) to measure: total phosphorus (TP), total dissolved phosphorus (TDP), dissolved organic carbon (DOC) and total nitrogen (TN). A continuous increase in nutrient release was observed for all measure parameters; however, the impact of microbial activity differed among nutrients. Cores where microbial activity was inhibited had larger amount of nitrogen release, but lower levels of phosphorus release. Understanding the release of nutrients from the permafrost over the long-term can help model nutrient concentrations that will be added to arctic freshwater ecosystems with climate warming.

Recommended Citation:
Tellez , Aracely ; Lougheed , Vanessa . "The effects of permafrost thaw on long-term nutrient release into Arctic Tundra ponds" (2014). COURI Symposium Abstracts, Spring 2014, ID= 300

Pre-Research

Creating a closed-loop recycling system for waste materials involved in fused deposition modeling, and studying the degradation of those materials

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Polycarbonate (PC) and acrylonitrile butadiene styrene (ABS) are polymers commonly used for Fused Deposition Modeling (FDM), a commonly used form of 3D printing (3DP). Here the polycarbonate sheet is used as a platform upon which ABS parts are printed. These PC sheets are usually thrown away after all of their surface area has been used in the printing process and are considered a waste product. As the use of FDM and other 3DP technologies increases, there is a great need to establish sustainable manufacturing models. There is also great interest in the application of FDM in austere environments, namely space-based, where a limited amount of material is available. Our research is a two-fold approach which intends to: 1) establish a recycling process for FDM waste materials as well as printed parts in a closed-loop manufacturing process; and 2) evaluate the mechanical degradation of ABS and ABS-based polymer composites. The ABS-based composites were designed to mitigate the thermomechanical degradation associated with re-processing of 3D printed parts. We believe that by improving the effectiveness of recycling these polymers, one need not discard materials associated with the FDM process, thereby significantly reducing cost and waste.

Funding Source: COURI

Production of endohedral metallofullerenes (EMF)

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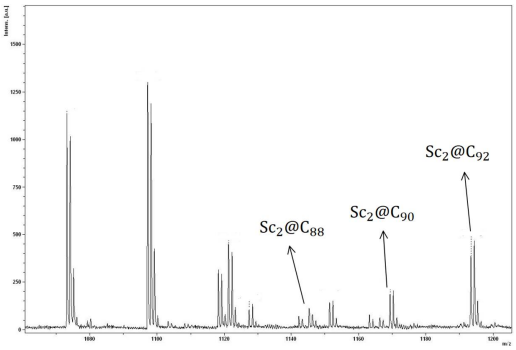
Research with endohedral metallofullerenes (EMF) is rapidly expanding into other areas such as photovoltaics, medicine, and nanotechnology. EMFs are composed of atoms or clusters of atoms trapped inside a fullerene cage. This work involves the preparation, separation and characterization of a series of new EMFs containing Scandium or Scandium Carbide. These EMFs were prepared using an arc-discharge reactor, followed by solvent extraction and HPLC (high performance liquid chromatography) and MALDI (matrix-assisted laser desorption/ionization) characterization. Some of the new compounds identified include: $Sc_2@C_{88}$, $Sc_2@C_{90}$, and $Sc_2@C_{92}$.



Funding Source: National Science Foundation

Recommended Citation:
Guerrero-Ayala , Miguel ; Echegoyen , Luis ; Chen , Chian-Hsiang ; Echegoyen , Luis . "Production of endohedral metallofullerenes (EMF)" (2014). COURI Symposium Abstracts, Spring 2014, ID= 396

Smashing ions to unveil the secrets of our building blocks: a brief outline of the RHIC experiments at BNL and the efforts to explain them

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Quantum Chromodynamics (QCD) is the theory of quarks and gluons, the elementary particles that constitute hadrons such as the protons and neutrons of ordinary matter. By positing the existence of these quarks and gluons, physicists were able to begin constructing new hypothesis in answer to some of the most interesting fundamental questions, which have never failed to capture the curiosity and wonder of scientists, philosophers, and laymen alike. An introduction to the basics of QCD and the quark-gluon plasma (QGP) will be presented. Next, the Relativistic Heavy Ion Collider (RHIC) and the STAR Detector at Brookhaven National Lab will be discussed due to their importance in providing experimental evidence about the properties and phases of QCD and QGP. The goals of the research being done at Brookhaven, how RHIC and STAR are allowing physicists to gather relevant data, and the results obtained thus far will be explained. The goal of this outline on QCD and RHIC experiments is to build the basic knowledge needed to participate in the UC Davis REU this summer and to begin doing research in nuclear physics at UTEP.

Recommended Citation:
Hodson , Erin ; Incera , Vivian . "Smashing ions to unveil the secrets of our building blocks: a brief outline of the RHIC experiments at BNL and the efforts to explain them" (2014). COURI Symposium Abstracts, Spring 2014, ID= 366

Synthesis and photochemical reactions of 1,4,5,8-anthracenetetrone

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In this research, 1,4,5,8-anthracenetetrone was selected as a starting material for the photo-Friedel-Crafts acylation using sunlight as a light source. 1,4,5,8-anthracenetetrone has a structure similar to 1,4-naphthoquinone, which reacts with aldehydes by photo-Friedel-Crafts acylation to afford 2-acyl-1,4-naphthalenediols. We previously reported that these 2-acyl-1,4-naphthalenediols display cytotoxicities against leukemia and lymphoma cells. Based on the results, we hypothesize that photo-Friedel-Crafts acylation reactions of 1,4,5,8-anthracenetetrone provide compounds that exhibit further potent cytotoxicities against those cancer cells. 1,4,5,8-anthracenetetrone was prepared by a reported procedure. The solar-driven reaction of 1,4,5,8-anthracenetetrone with various aldehydes will be performed on the rooftop of the Chemistry and Computer Science Building. The products of the reaction will be investigated for cytotoxicities against leukemia and other cancers. Potential cytotoxic effects of the products may contribute to prospective anticancer therapeutics.

Recommended Citation:
Pastrana , Ai ; Mito , Shizue . "Synthesis and photochemical reactions of 1,4,5,8-anthracenetetrone" (2014). COURI Symposium Abstracts, Spring 2014, ID= 394

An anomaly in the proton radius: New insight in quantum electrodynamics

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The proton, composed of 2 up quarks and 1 down quark, was measured to have a different radius than previously found. The new value is 4% smaller and 10 times more precise than in previous results. The new measurement technique involves substituting the electron revolving around a proton with a muon. The muon revolves closer to the proton, which results in a greater overlapping of the wave function of the ground state. This overlapping creates a difference in energies, named a Lamb shift. The energy difference is then exploited to excite the muon with a specific energy that is calculated through the dependency of the radius of the proton, allowing a really high degree of precision. The large difference in the radius as compared to previously calculated values proposes further questions and a serious problem to the current understanding of quark and lepton interactions and even for the foundations of Quantum Electrodynamics. This project reviews this problem in the context of elementary particle physics and suggests some possible directions for its solution.

Recommended Citation:
Zamarripa-Roman , Brian ; Ferrer , Efrain . "An anomaly in the proton radius: New insight in quantum electrodynamics" (2014). COURI Symposium Abstracts, Spring 2014, ID= 370