2013 utep couri summer symposium

Saturday, August 3, 2013
Health Sciences and School of Nursing Building (HSSN)

Undergraduate Poster Presentations and Reception

Over 100 UTEP and visiting undergraduate researchers presenting
10:00 AM – 12:45 PM
HSSN Lobby

Eminent Speaker: Jill B. Becker

Professor of Psychology and Psychiatry, University of Michigan – Ann Arbor
"Sex Differences, Gender and Addiction"
1:30 PM – 2:30 PM
HSSN 217

Awards Ceremony

Awards sponsored by the UTEP Graduate School and COURI
2:30 PM-3:00 PM
HSSN 217

The symposium is sponsored by the Campus Office of Undergraduate Research Initiatives (COURI) in collaboration with: ▪ NIH-Bridges to the Baccalaureate Program ▪ NSF-UT System Louis Stokes Alliance for Minority Participation (LSAMP) ▪ NIDA-Summer Mentoring and Research Training: Methods in Neuroscience of Drug-Abuse (SMART MIND) ▪ NSF-Summer REU in Chihuahuan Desert Biodiversity ▪ NSF-Summer REU Partnerships for Research and Education in Materials (PREM) ▪ NSF-UTEP Summer REU Program in Applied Intelligent Systems

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Health Sciences and Nursing Building

About this Symposium

The summer of 2013 has been a particularly exciting one for the mission of undergraduate research at the University of Texas at El Paso. The number of externally and internally funded formal programs that are contributing to and participating in this end-of summer symposium has increased dramatically from prior years. Before 2012, there were three to four programs whose students presented at the summer symposium. This year we had 14! The number of institutions represented also increased dramatically. Student researchers from 23 different US and international institutions came to UTEP this summer to conduct mentored research projects in this beautiful dessert-landscape, border-city campus. Many of us had the pleasure to interact closely with these students and got to know them a little better. They also got to know more about all of us, their mentors, program directors, coordinators, staff, local students and the El Paso people. They learned about the cross-culture that is so characteristic of this region, the friendliness of its people and most importantly, the cutting edge research that is taking place at this rapidly emerging research institution. The students' strong motivation, skills, hard-work and camaraderie were evident throughout the summer. We are delighted to witness poster presentations today from more than 120 students, from UTEP and elsewhere, demonstrating the results of their research efforts for the past 6-12 weeks. We also hope that for years to come all of these students remember us and all the positive experiences they had this summer.

Lourdes E. Echegoyen, PhD
COURI Director
August 3, 2013

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Health Sciences and Nursing Building

Eminent Speaker

Jill B. Becker, Ph.D.

Professor of Psychology & Psychiatry
Senior Research Scientist,
Molecular & Behavioral Neuroscience Institute
Senior Scholar, Neuroscience Program
Reproductive Sciences Program
University of Michigan Health System
Ann Arbor, Michigan

Sex Differences, Gender and Addiction

Sponsored by

NATIONAL INSTITUTES OF HEALTH
NIDA NATIONAL INSTITUTE ON DRUG ABUSE
The Science of Drug Abuse & Addiction

Programs Represented

Applied Intelligent Systems Research Experiences for Undergraduates

Bridges to the Baccalaureate

Chihuahuan Desert Biodiversity Research Experiences for Undergraduates

COURI Summer Undergraduate Research Mentoring Experience

El Paso Community College Research Initiative for Scientific Enhancement

Minority Experience through Travel and Education in Science

National Center for Border Security and Immigration Summer Internship Opportunity

National Research Experience for Undergraduates Program-Mathematical Association of America

Partnerships for Research and Education in Materials - Research Experiences for Undergraduates

Provost Summer Research Assistants Program

Research Initiative for Scientific Enhancement

Summer Mentoring and Research Training: Methods in Neuroscience of Drug Abuse

Summer School of Nanomaterials 2013

University of Texas System Louis Stokes Alliance for Minority Participation

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Institutions Represented

Beijing Normal University, China
Biola University
California State University, Long Beach
Eastwood High School
El Paso Community College
Instituto Tecnológico y de Estudios Superiores de Monterrey
Ripon College
Shantou University, China
State University of New York at Brockport
Texas A&M University
The University of North Texas
The College of William and Mary
The University of Texas at Brownsville
The University of Texas at Dallas
The University of Texas at El Paso
Truman State University
Universidad Autónoma de Ciudad Juárez
Universidad Metropolitana - Cupey, Puerto Rico
University of California, Santa Barbara
University of Maryland, College Park
University of Notre Dame
University of Puerto Rico, Mayaguez
University of Puerto Rico, Río Piedras

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Program Acknowledgements & Generous Funding

National Science Foundation

- AIS (Applied Intelligent Systems) REU
- CDB (Chihuahuan Desert Biodiversity) REU
- PREM (Partnership for Research in Education and Materials)REU
- UT System LSAMP (Louis Stokes Alliances for Minority Participation)

National Institute on Drug Abuse

- SMART MIND (Summer Mentoring & Research Training: Methods in Neuroscience of Drug-Abuse

National Institutes of Health

- Bridges to the Baccalaureate

Campus Office of Undergraduate Research Initiatives

- Summer Undergraduate Research Mentoring Experience (SURME)

Office of the Provost

- Summer Research Assistant Program

The Graduate School

NATIONAL INSTITUTES OF HEALTH
NIDA NATIONAL INSTITUTE ON DRUG ABUSE
The Science of Drug Abuse & Addiction

NIH
National Institutes of Health

UTEP
COURI
CAMPUS OFFICE OF UNDERGRADUATE RESEARCH INITIATIVES

THE UNIVERSITY OF TEXAS AT EL PASO
GRADUATE SCHOOL

OFFICE OF THE PROVOST
THE UNIVERSITY OF TEXAS AT EL PASO

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Saturday, August 3, 2013 - 10:00 AM - 3:00 PM
Health Sciences and Nursing Building

Technical Program

Biomedical, Behavioral & Social Sciences

Poster No	Title and Authors
1A	**The effects of religious primes on support for political policies** *Rafael Aguilera^, Jessica Shenberger, Michael Zárate**
2B	**Ferroptosis in Trypanosoma cruzi** *Brunna C. Almeida^, Eva A. Iniguez, Rosa A. Maldonado**
3A	**The effect of lipid raft inhibitor,methyl-b-cyclodextrin, on metastatic migration of human breast cancer cells, MDA-MB-231** *Lauren J. Bonilla^, Siddhartha Das*, Atasi De Chatterjee, Priscilla Guevara*
4A & 4B	**Localization of glycine transporter 1 in the Nigro-Striatal pathway in the mouse central nervous system** *Danny Bustos^, Courteney Youngs^, Miryam Pando, Shweta Lavania, Manuel Miranda**
5A	**Cholesterol side-chain degrading enzymes FadD17 and FadD19 of Mycobacterium tuberculosis** *Veronica Escalante^, Yolva I. Loya, Marwan M. Fattouhi, Johnathan S. Abou-Fadel, Rhone M. Mendoza, Hugues Ouellet**
6B	**Immobilization of DNA codes on paper for rapid pathogen detection** *Mengli Feng^, Alejandra Valadez, Xiujun Li**
7A	**The effects of insulin on nicotine self-administration in an animal model of diabetes** *Rodolfo Flores^, Joseph Pipkin, Cecilia Hinojosa, Christian Tejeda, Laura E. O'Dell**
8A & 8B	**Northern blotting analysis of Her-2 mRNA in human breast cancer cells** *Luis E. Fons^, Allyson D. Benson^, Courtney L. Becerril, Irving Miramontes, Natzidielly Lerma, Karla Parra, Jasmine Saenz, Cynthia Rodriguez, Paloma Valenzuela, Giulio Francia**
9A & 9B	**In vitro and In vivo analysis of breast cancer cell lines** *Alejandra E. Gallegos^, Cynthia A. Reyes^, Paloma A. Valenzuela, Karla Parra, Natzidielly Lerma, Courtney Becerril, Cynthia M. Rodriguez, Giulio Francia**
10B	**Searching for ferroptosis in Leishmania major** *Lorena Garcia^, Eva A. Iniguez, Rosa A. Maldonado**
11A	**Dopamine is essential for courtship behavior in Drosophila melanogaster** *Perla A. Gonzalez^, Junghwa Lim, Kyung-An Han**

Poster No	Title and Authors
12B	**Enhanced rewarding effects of nicotine as assessed by place preference procedures in a rodent model of diabetes** *Cecilia A. Hinojosa^, Joseph Pipkin, Christian Tejeda, Rodolfo Flores, Laura E. O'Dell**
13A	**Cholesterol-disrupting drug nystatin blocks the migration of metastatic breast cancer cells, MDA-MB-231** *Thao N. Hoang^, Priscilla Guevara, Atasi De Chatterjee, Siddhartha Das**
14B	**Thymidine incorporation assays of HER-2 positive breast cancer cell lines including one derived from a Hispanic patient** *Sarah N. Jallad^, Giulio Francia*, Paloma A. Valenzuela , Karla Parra, Natzidielly Lerma, Cynthia Rodriguez, Charles T. Spencer, Renato J. Aguilera, Gudmundur Thordarson, Guido Bocci*
15A	**Evaluation and validation of IMPs (IMP1. p62, Koc) as TAAs biomarkers in acute myelogenous leukemia (AML)** *Chelsy Jaramillo^, Mei Liu, Liping Dai, Jianying Zhang**
16B	**Organization of hypocretin/orexin neuronal projections to the hypothalamic paraventricular nucleus in the adult male rat** *Eszter A. Kish^, Sarah D. Chenausky, Anais Martinez, Arshad M. Khan**
17A	**Homelessness in the El Paso region: counting the homeless and determining the prevalence of serious mental Illness in the homeless population** *Jonathan D. Klassen^, Ernesto Castaneda-Tinoco*, Curtis Smith*
18B	**Changes in brain signaling mechanisms in response to stress may play a role in the development of PTSD** *Gabriel A. Lodoza^, Juan M. Bolanos, Ryan Saenz, Jameel N. Hamdan, Christina Darcy, Benjamin R. Diaz, Kristin Gosselink**
19A	**Engineered HIV-derived viruses for specific gene delivery in glycinergic neurons** *Ashley B. Lopez^, Hector Cuevas, Changsoo Seong, Manuel Miranda**
20B	**Identifying imposters: An analysis of the calibration between confidence an accuracy in cross-race face perception** *Nahomi N. Martinez^, Kyle J. Susa**
21A & 21B	**Understanding interaction in cross-functional teams** *Keicha M. Myers^, Angelica Martinez^, Ivan Gris, David Novick**
22B	**Nitrosative stress-induced neurodegenerative disorders prevented by psoralidin intervention** *Gabriela M. Negron^, José Marín, Parijat Kabiraj, Armando Varela, Mahesh Narayan**
23A	**Detection of parasites in ancient Native American coprolites from Sierra Diablo Cave** *Sonja K. Payne^, Rosa A. Maldonado-Medina*, David L. Carmichael**
24B	**Cytotoxic effects of acylated hydroquinones on selective lymphoid cell lines** *Diego A. Pedroza^, Fernando De Leon , Armando Varela-Ramirez, Carolina Lema, Renato J. Aguilera*, Shizue Mito**

Poster No	Title and Authors
25A	**Crossing borders and modern-day slavery: Human trafficking in the U.S./Mexico border region** *Alejandra Ramos Gomez^, Ernesto Castaneda**
26B	**Alcohol and methamphetamine inhibit neurite outgrowth and cause neurodegeneration by altering G betagamma-microtubule association in PC12 cell model** *Arsenio L. Reyes^, Jorge A. Sierra-Fonseca, Sukla Roychowdhury**
27A	**Economic security for Hispanics on the border: Mobility, poverty, and structural assimilation among Hispanics on the Texas-Mexico border** Annie C. Rhodes^, Ernesto Castañeda
28B	**JAK3: Not just another kinase target for leukemia and lymphoma therapy** Victoria M. Rivera-Peterson^, Georgialina Rodriguez, Robert A. Kirken*
29A	**Early College High School - The importance of internships and study abroad to employers** Beatriz E. Rodriguez^, Trinidad Morales*
30A & 30B	**Effects of stress on methamphetamine self-administration in rats** Ryan Saenz^, Benjamin Diaz^, Juan Bolanos, Jameel Hamdan, Kristina Barron, Gabriel Lodoza, Christina D'Arsy, Kristin Gosselink*
31A	**Inhibition of glycine transporters activity by the venom from Chihuahuan Dessert rattlesnakes** *Abel G. Saucedo^, Manuel Miranda-Arango**
32B	**What is the role of NKT cells in Francisella tularensis immunity?** *Nicole R. Setzu ^, Charles T. Spencer*, Mireya Ramos*
33A	**Reconnaissance of possible mosquito vectors for arthropod-borne viruses in El Paso, TX** *Albert Soliz^, Cindy Crews, Lee Sewell, Douglas Watts*
34B	**Activation of stress systems in the nucleus accumbens (NAcc) enhances anxiety-like behavior produced by nicotine withdrawal in female versus male rats** *Christian H. Tejeda^, Joseph Pipkin, Rodolfo Flores, Cecilia A. Hinojosa, Laura E. O'Dell**
35A	**A fundamental study to understand disengagement by dorsal striatal function: dopamine and habits** *Ricardo J. Vazquez^, Mabel N. Terminel, Alice E. Hernandez, Jeremiah Ramos, Edward Castaneda**
36B	**Engineering of a plasmid expressing the GlyT2 and NSF under single CMV promoter** *Jonathan Vazquez-Perez^, Ashley B. Lopez, Manuel Miranda-Arango**
37A & 37B	**Development of molecular probes to study the biology of the Her-2 gene in breast cancer** *Oscar G. Veloz^, Crystal M. Scott^, Natzidielly Lerma, Chantal Vidal , Courtney L. Becerril, Irving Miramontes, Karla Parra, Paloma Valenzuela, Cynthia Rodriguez,Giulio Francia**
38B	**The role of dopamine D2 receptor in brain development and ethanol-induced behavioral disinhibition** *Mason Youngblood^, Paul Sabandal, Jessica Burciaga, Kyung-An Han**

Chemistry & Biochemistry

Poster No	Title and Authors
39A	**Structural determination of the circadian rhythm protein circadian locomotors output cycles kaput (CLOCK)** *David Acosta^, Scott Rush , Gustavo A. Avila, Chuan Xiao**
40B	**Synthesis of 2,1,3-benzothiadiazole functionalized triphenyl amines capable of hydrogen-bonding: small molecule models for extended hydrogen-bonded assemblies** *Rudy R. Acosta^, Jose Nunez*
41A	**Synthesis of the disaccharide αGal-1,3αGal and its conjugation to a carrier protein** *Matthew S. Anderson^, Dr. Katja Michael^, Nate Schocker*
42B	**Method development for bisphenol A analysis in milk using stir bar sorptive extraction-thermal desorption-gas chromatography/mass spectrometry** *Suzanne A. Apodaca^, Wen-Yee Lee^*
43A	**Novel fullerene-binding gels: synthesis and characterization of Zn(II) bis-N-(4-pyridyl) benzamide acrylate complex and studies of its fullerene-binding properties** *Shokooh Bahadorzadeh^, Melissa G. Marrufo, Alejandro J. Metta, Juan C. Noveron**
44B	**Single-molecule fullerene metallo-micelles** *Brian Barraza^, Md T. Islam, Juan C. Noveron**
45A	**Solar cells with self-organized components: novel amphiphilic PCBM Zn(II) complexes** *Andres H. Belmont^, Venkata Neti, Luis Echegoyen, Juan C. Noveron**
46B	**La@C82, a potential donor for the preparation of an all-fullerene bilayer solar cell** *Guillermo A. Campos^, Agustin Molina-Ontoria, Fang Fang Li, Luis Echegoyen**
47A	**Synthesis and characterization of dibenzo(b,f)(1,5)diazocine-6,12(5H,11H)-dione derivatives for Chameleon 2 displays** *Hiram Castillo-Marquez^, Ziwei Pan^, Tomas Espinosa, Saideh Mortazavi, James Salvador**
48B	**Novel biodegradable inks for 3-D printing** *Andrew Chavez^, James T. Moore, Brian Barraza, Juan M. Sanchez, Ryan Wicker*, Juan C. Noveron**
49A, 49B, & 49C	**Initialization of structural proteomic studies of the giant marine virus CroV** *Jennie Choi^, Duer Bolotaulo^, Martin Chacon^, Sayan Chakraborty, Gustavo A. Avila, Matthias G. Fischer, Curtis A. Suttle, Chuan Xiao**
50B	**Porphyrin-based interfacial layers for organic solar cell applications** *Eden A. Couillard^, Danisha M. Rivera-Nazario, Luis A. Echegoyen**
51A	**Synthesis and characterization of coordinatively unsaturated bimetallic units** *Tianyu Duan^, Javier Grajeda, Dino Villagran**

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52B	**Synthesis of racemic profens** *Tomas E. Espinosa^, Saideh Mortazavi, Ziwei Pan, Hiram Castillo, James Salvador**
53A	**Effect of pro-domain on Cruzain maturation** *Jesus B. Garcia^, Marisol Romero, Veronica Gonzalez, Mahesh Narayan**
54B	**Synthesis of indolinone derivatives with solar reactions of quinone derivatives** *Jorge D. Guerra^, Jong Saunders, Quang H. Luu, Shizue Mito**
55A	**Investigation of donor-(π)-acceptor triphenyalamine-based dyes in dye sensitized solar cells** *Yanru Guo ^, Robert W. Cotta, Luis Echegoyen**
56B	**Synthesis of a photoreactive nitroindoline linker and its application in glycopeptide synthesis** *Jihui Li^, Luis A. Barrera, Katja Michael**
57A	**Synthesis of 5,8-dihydroxy-1,4-naphthoquinone and its homologation under sunlight** *Jingzhe Li^, Mengwei Yuan, Quang H. Luu, Shizue Mito**
58B	**Photochemical synthesis of peptide oxo-esters with minimal epimerization and development of photoactive solid support for peptide synthesis** *Chenxi Liu^, Alfredo Ornelas, Katja Michael**
59A	**Micro-sheets of HTiNbO5 for photocatalytic purposes** *Natalie Lopez-Rodriguez^, Victor Correa, Maryam Zarei-Chaleshtori , Manuel Ramos*, Russell Chianelli*
60B	**Synthesis and characterization of bimetallic metal-organic frameworks** *Mariana Marcos^, Jose M. Veleta, Dino Villagran**
61A & 61B	**Chemical synthesis and morphology of silver micro-spheres** *Chelsea M. Marrero-Vidal^, Jonathan M. Rodríguez-Cruz^, Diosetlyn Rojas-Ramos, Manuel Ramos*, Luis Hadame, Russell Chianelli**
62B	**Nanomaterials via DNA-templated photopolymerization of Zn (II) bis-N-(4-pyridyl) benzamide acrylate** *Melissa G. Marrufo^, Shokooh Bahadorzadeh, Alejandro J. Metta, Juan C. Noveron*, Michael Chabinyc*
63A	**Single-molecule metallo-micelles with fullerene-binding cores** *Andrew J. Mitchell^, Md T. Islam, Brian Barraza, Juan Noveron**
64B	**Single molecule metallo-micelles: synthesis, self-assembly, and biological properties** *James T. Moore^, Andrew Chavez, Jose Marin, Sarit Pal, Juan C. Noveron**
65A	**Synthesis of dibenzo(b,f)(1,4)diazocine-6,11(5H,12H)-dione derivatives, Chameleon 1 compounds** *Ziwei Pan^, Hiram Castillo-Marquez, Tomas Espinosa, Saideh S. Mortazavi, James Salvador**
66B	**Novel biomass conversion to solar cell products** *Lance S. Park^, Delia J. Valles-Rosales, Juan C. Noveron*
67A	**Synthesis and solar reaction of 1,4,5,8-anthracenetetrone with aldehyde** *Ai S. Pastrana^, Shizue Mito**

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69A	**Octaethyl-porphyrin functionalized silica gel for fullerene separation** *Paulina A. Quinonez^, Danisha Rivera-Nazario, Luis Echegoyen*, Guillermo Campos*
70B	**Study of multielectron redox chemistry through multiple bonded bimetallic species of the type M2-L-M** *Nancy Rodríguez^, Dino Villagrán**
71A	**Silver micro-spheres as anti-bacterial agent** *Diosetlyn Rojas-Ramos^, Jonathan M. Rodríguez, Manuel A. Ramos*, Luis Hernandez-Hadame, Ricardo A. Bernal*, Russell Chianelli*, Victor Correa*
72B	**Synthesis and evaluation of new metal binding fluorophores** *Laura Saucedo^, Robinson Roacho, Alejandro Metta, Keith H. Pannell**
73A	**Synthesis of isoquinoline derivatives by solar reaction of imine derivatives and quinones** *Jong G. Saunders^, Jorge D. Guerra, Quang H. Luu, Shizue Mito**
74A & 74B	**Self-organized single-molecule flowers: Towards controlling fullerene aggregation for solar cells** *Ember L. Sikorski^, James T. Moore^, Juan C. Noveron**
75A	**Electronic communication in covalently linked mixed-valent compounds** *Mark B. Smith^, Dino Villagrán**
76B	**Synthesis and characterization of new amide-BODIPY fluorophores** *Peiyu Tu^, Robinson Roacho, Laura Sausaido, Keith H. Pannell**
77A	**Redox potential tuning by mixed-ligand quadruply bonded dimolybdenum compounds** *Nathalie Valdez^, Dino Villagran**
78B	**Synthesis of an endohedral metallofullerene epoxide: The missing O-bridged analog of methanofullerenes** *Juan A. Valdez Moreira^, FangFang Li, Luis A. Echegoyen**
79A	**Bimetallic systems as platforms for supramolecular chemistry and metal-organic frameworks** *Jose M. Veleta^, Mariana Marcos, Dino Villagran**
80B	**Organic donor-acceptor dendrimers as potential photovoltaic materials: Synthesis, structural categorization, and photophysical study** *Niccolo L. Villafria^, Jose E. Núñez*, Zhi Dai*
81A	**Synthesis and characterization of electrically responsive molecules based on aluminum(III) complexes** *Jose R. Villaseñor^, Brian Jacinto, Shizue Mito**
82B	**Structural studies of a core mammalian circadian clock protein ARNTL: Aryl hydrocarbon Receptor Nuclear Translocator-Like** *Lu Xiao^, Gustavo Avila, Chuan (River) Xiao**
83A	**Synthesis of two new nitrogen heterocyclic compounds: pyridazine and quinazoline derivatives** *Mengwei Yuan^, Jingzhe Li, Quang H. Luu, Shizue Mito**

Computer Science, Engineering, Physics & Mathematics

Poster No	Title and Authors
84B	**A testbed for evaluating the robustness of game-playing agents** *Miguel Aleman Pagan^, Christopher Kiekintveld**
85A	**Comparing and extending approaches that access scientific databases through semantic web ontologies** *Joshue Cardoza^, Natalia Villanueva-Rosales**
86B	**Sealing FDM fabricated parts** *Alejandro Cuaron^, Mohammad S. Hossain, David Espalin, Francisco R. Medina, Ryan B. Wicker**
87A	**Effective algorithms for computing covariance and correlation based on privacy-protected data** *Joshua A. Day^, Ali Jalal-Kamali, Vladik Kreinovich**
88B	**Development of 'Lick and Stick' wireless temperature sensors** *Diego Delfin^, Hasanul Karim, Sara M. Gaytan, Raymond C. Rumpf, Yirong Lin**
89A	**Molecular dynamics study of phthalocyanine and sulfonated-phthalocyanine and C60 interface** *Carlos M. Diaz^, Marco Olguin, Tunna Baruah*, Rajendra Zope*
90B	**Investigating the electronic structure of dye attached fullerenes for applications in photovoltaics** *Amanda S. Garnica^, Tunna Baruah*, Rajendra Zope*
91A	**Interatomic potential for aluminum for high pressure atomistic simulation: The Embedded Atom Method** *Punam Ghimire^, Ramon J. Ravelo**
92A & 92B	**Image fusion** *Brenda T. Gonzalez^, Jasmine M. Puente^, Helmut Knaust**
93A, 93B & 93C	**Iris image compression utilizing the FBI compression algorithm** *Ariel I. Gonzalez-Guevara^, Aaron Ortega^, Melissa A. Martinez^, Helmut Knaust**
94B	**Heat transfer characteristics of liquid methane** *Lisa M. Haisan^, Adrian Trejo, Manuel J. Galvan, Ahsan R. Choudhuri*, Nate V. Robinson*
95A	**Student busing system** *Luis C. Hernandez^, Mario Salomon, Eric Smith**
96B	**Improving mechanical properties of FDM built parts** *Lluvia Y. Herrera^, Chi Yen Kim*, Ryan Wicker, David Espalin, Alejandro Cuaron, Mohammad S. Hossain*
97A	**Preventing stop the world: Identifying important characteristics for garbage collection** *Edward G. Hudgins^, Olac Fuentes*, Eric Freudenthal*
98B	**Investigation of metal oxide nanowires modified carbon materials for energy storage devices** *Hongguang Liu^, Shuvo A. Mohammad, Yirong Lin**
99A	**Combustion synthesis of nanostructured magnesium silicide** *Israel Lopez^, Evgeny Shafirovich**

Poster No	Title and Authors
100B	**An experimental investigation of a packet prioritization method for voice communication** *Winston Mann^, Nigel Ward**
101A	**Incorporation of 3D additive manufacturing with printed electronics** *Jessica Montes^, Francisco Medina, Ryan B. Wicker**
102A & 102B	**Essay grading automation through machine learning algorithms** *Anthony Morse^, Emmanuel Tafoya^, Diego Aguirre, Olac Fuentes**
103A	**Spectral analysis of facial skin: detecting emotional state** *Juanita Ordonez^, Geovany Ramirez, Maria G. Jimenez, Olac Fuentes**
104B	**Carbon fiber reinforced polymer composites fabrication and testing** *Leonardo Orea-Amador^, Hasanul Karim, Sara Gaytan, Raymond Rumpf, Diego Delfin, Yirong Lin**
105A	**Assessing the effect of JPEG compression on computer vision algorithms** *Cristina Padro Juarbe^, Geovany A. Ramirez, Olac Fuentes**
106B	**Electroless metal coatings of CoMoS2/Na2SiO3 and CoMo/CTAB** *Miriam Paez^, Brenda Torres, Gabriel Gonzalez, Manuel Ramos*, Russell Chianelli*
107A	**Eliminating the effects of JPEG compression using machine learning** *Jonathan Quijas^, Olac Fuentes**
108B	**Making energy more efficient: Development of a new drag model for the prediction of flow behavior of irregularly shaped particles** *Christian I. Rodarte^, Raufur Chowdhury, Norman Love**
109A	**Computer simulations of material strength** *Anthony J. Vasquez^, Jethro Gaglione, Ramon Ravelo**

Environmental & Geological Sciences

Poster No	Title and Authors
110B	**In search of Chagas disease in the Chihuahuan Desert - TX** *Steven A. Galvan^, Rosa A. Maldonado**
111A & 111B	**A survey of lizard malaria in the Southwest United States** *Andrew K Gibson^, Jordan A. Lynn^, Carl Lieb*, Doug Watts**
112B	**An ecogeographic analysis of the avifauna on Indio Mountains Research Station, Hudspeth County, Texas** *Allison R. Hanna^, Geoffry Wiseman, Jerry Johonson**
113A	**Updating geologic events of the terrestrial planets and the moon on a national planetary poster** *Luis Martinetti ^, Ashley G. Nauer, Laura Serpa*, Amanda Nahm**
114B	**Mapping soil variations using geophysical methods to determine their effects on crop production** *Isaac A. Martinez^, Diane Doser**

Poster No	*Title and Authors*
115A	**Localization of the glycinergic cells in the retina of reptiles from the Chihuahuan Desert** *Alejandro Navarro^, Sarah M. Vacio, Jorge A. Pérez Leon, Carl Lieb, Manuel Miranda-Arango**
116B	**Initial cytoarchitectonic characterization of the forebrain of the Western diamondback rattlesnake, Crotalus atrox** *Kristen K. Pennington^, Arshad M. Khan**
117A	**Species composition of aquatic invertebrates in dust and wetlands in the northern Chihuahuan Desert** *Allison Schmidt^, Jose Rivas, Elizabeth J. Walsh**
118B	**Geochemical characterization of groundwaters in Dockum Aquifer of Midland Basin, TX** *Emmanuel Sosa^, Francisco Reyes, Mark Engle, Lixin Jin**
119A	**Population genetics of the Chihuahuan Desert endemic living rock cactus (Ariocarpus fissuratus var. fissuratus)** *Megan Vahsen^, Michael Moody**

Special Thanks

To all faculty members, staff, graduate students and post-doctoral fellows who mentor students, particularly those presenting at this symposium, for their dedication to the mission of undergraduate research

Biomedical, Behavioral and Social Sciences

The effects of religious primes on support for political policies

Rafael Aguilera^, Jessica Shenberger, Michael Zárate *

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

In the wake of 9/11, and more recently the Boston Marathon, a line of research has dedicated itself to explaining under what conditions individuals will engage in violent acts of terrorism. Current research demonstrates that priming individuals with religion concepts leads to both positive and negative social behaviors. Furthermore, individuals primed with religion are more willing to follow the suggestions of other individuals in various social experiments. The goal of the present study is to extend previous research by investigating whether religion influences to what extent individuals will endorse critical social issues of the day. A total of 80 participants will be recruited from the University of Texas at El Paso either for course credit or to be entered into a raffle. Participants will first be introduced to either a religious (Lady of Guadalupe) or non-religious (Frida Kahlo) prime and be asked to complete a short writing task. Participants will then form a small group with a confederate (an actor who poses as a participant) and be asked to consider legislation on three current social issues. The confederate will argue in strong support of each social issue. Afterwards, participants will rate the extent to which they endorse legislation on each of these social issues. Finally, participants will complete several surveys including a demographics form. We hypothesize that participants primed with religious concepts will be more consistent with the leader's suggested policy.

Funding Source: Louis Stokes Alliance for Minority Participation

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Ferroptosis in Trypanosoma cruzi

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Around 20 million people are stricken by Chagas disease in Central and South America. It is estimated that about 5 million people are supposed to develop the mains symptoms of the disease, such as cardiomyopathy and/or digestive disorders. The infection in human beings is caused by trypomastigote form of the parasite *Trypanosoma cruzi,* which is transmitted to animal and people by Triatomine insect vector. The objective of this study is to evaluate whether the mechanism of death cell called ferroptosis is present in *T. cruzi.* Our research is based on testing the drug Rachid(R1), known to induce ferroptosis in cancer cells. We tested R1 at concentrations ranging from 30 M to 0.234 M.The parasite viability was determined by *A*lamar Blue assay, the experiments were performed in triplicate. Positive control (benznidazole 800 M) and negative controls (DMSO 1%) were included for each trial.After 72 hours incubation with 30 M R1, was observed 62% survival of the parasites. The production of ROS independent of apoptosis is directly link to ferroptosis in order to assets if the antiparasitic activity is due to this mechanism we plan to perform the ROS assay/flow cytometer.

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Recommended Citation:
Almeida , Brunna ; Iniguez , Eva ; Maldonado , Rosa . "Ferroptosis in Trypanosoma cruzi" (2013). COURI Symposium Abstracts, Summer 2013, ID= 244

The effect of lipid raft inhibitor,methyl-b-cyclodextrin, on metastatic migration of human breast cancer cells, MDA-MB-231

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Lipid Rafts (LRs) are specialized regions of the cell membrane that serves as a platform to transduce external signals downstream of the plasma membranes. Recent reports suggest that LRs are also important for cellular transformation and malignancy. Because stage IV breast cancers are often associated with the metastatic migration, we hypothesized that the synthesis and expression of LRs could be linked to this migratory process. Therefore, we tested methyl-b-cylodextrin (MBCD), a LR inhibitor, on the migration of an invasive breast cancer cell, MDA-MB-231. Side by side, we also included MCF-7, a non-invasive breast cancer cell to compare our results. The MDA-MB-231 cells were cultured in Dulbecco's modified eagle's media (DMEM) at 37oC and incubated overnight in a six-well plate. The MCF-7 cells were cultured in Roswell Park Memorial Institute-1640 media (RPMI-1640) at 37oC in a six-well plate until they reached the confluency. The old media was then replaced with new media containing 5% serum in order to starve the cells. The migration assays were then conducted in the presence and absence of MBCD at different concentrations (i.e. 0, 0.25, 0.5, 1, 5 and 10 mM). Our results demonstrate that MBCD inhibits the migration of MDA-MB-231 cells in a dose-dependent manner and the IC50 of MBCD is 1 mM. As expected, the non-migratory MCF-7 cells were not affected by MBCD. We propose that LRs should be targeted for developing anti-breast cancer agents in the future.

Funding Source: NIH

Recommended Citation:
Bonilla , Lauren ; Das , Siddhartha ; De Chatterjee , Atasi ; Guevara , Priscilla . "The effect of lipid raft inhibitor,methyl-b-cyclodextrin, on metastatic migration of human breast cancer cells, MDA-MB-231 " (2013). COURI Symposium Abstracts, Summer 2013, ID= 145

Localization of glycine transporter 1 in the Nigro-Striatal pathway in the mouse central nervous system

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Glycine is a known inhibitory neurotransmitter in the CNS, but the location of its neuronal circuits are not fully tracked in the brain. Glycine transporter 1 (GlyT1) is a cell surface protein involved in the uptake of glycine in the CNS. Its areas of expression are not fully known, but it is suggested to be expressed in both glial cells and neurons. In this project, we are searching at existing dopaminergic circuits and their corresponding structures for the presence of GlyT1. We are interested in the substantia nigra, ventral tagmental area, and entopeduncular nucleus as potential brain regions containing GlyT1. For this experiment we prepare coronal or sagittal sections at 30 microns each and subjected them to different staining techniques. Experiments using immunofluorescence include antibodies targeting GlyT1, dopamine transporter (DAT), and tyrosine hydroxylase, and other markers. Immunofluorescence experiments are underway to analyze the location of GlyT1 containing cells along the substantia nigra and striatum.

Funding Source: NIDA, SMART MIND, COURI

Recommended Citation:
Bustos , Danny ; Youngs , Courteney ; Pando , Miryam ; Lavania , Shweta ; Miranda , Manuel . "Localization of glycine transporter 1 in the Nigro-Striatal pathway in the mouse central nervous system" (2013). COURI Symposium Abstracts, Summer 2013, ID= 168

Cholesterol side-chain degrading enzymes FadD17 and FadD19 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. Research has been done on the cholesterol AB rings degradation, but much less is known about the degradation of the CD rings and aliphatic side-chain, which are thought to be shortened by -oxidation reactions. Our laboratory investigates the role of several *fadD* and *fadE* genes, encoding for probable 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 recombinase system approaches, respectively. 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) ; NIH (5R25GM049011-14)

Recommended Citation:
Escalante , Veronica ; Loya , Yolva ; Fattouhi , Marwan ; Abou-Fadel , Johnathan ; Mendoza , Rhone ; Ouellet , Hugues . "Cholesterol side-chain degrading enzymes FadD17 and FadD19 of Mycobacterium tuberculosis" (2013). COURI Symposium Abstracts, Summer 2013, ID= 166

Immobilization of DNA codes on paper for rapid pathogen detection

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DNA testing plays an important role in advancing basic research, pathogen detection and disease diagnosis. Currently, DNA microarrays on glass, silicon, or nylon substrates are commonly used for DNA detection, but these methods are time-consuming, due to the low surface to volume ratio of their surfaces. On the contrary, paper is a low-cost porous material which can provide 3D substrate for rapid DNA testing. We have developed a simple method to immobilize DNA codes on paper for rapid pathogen detection. The DNA probe immobilization process only takes ~1.6 hours totally, compared to more than 8 hours for DNA immobilization on glass or silicon immobilization. The results also shows higher probe density on paper than that on glass substrates when measuring the fluorescence intensity of Cy3-labled immobilized DNA probes after five high-stringency washing steps. Because of high probe density, the method is capable of measuring higher concentration of pathogen samples than conventional DNA microarray methods. The combination of such a simple DNA probe immobilization method with integrated paper-based microfluidic devices will greatly promote the development of low-cost and rapid pathogen detection and disease diagnostics in resource-poor settings, such as developing nations.

Funding Source: Beijing Normal University

Recommended Citation:
Feng , Mengli ; Valadez , Alejandra ; Li , Xiujun . "Immobilization of DNA codes on paper for rapid pathogen detection" (2013). COURI Symposium Abstracts, Summer 2013, ID= 140

The effects of insulin on nicotine self-administration in an animal model of diabetes

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The underlying cause of enhanced vulnerability to tobacco use in patients with diabetes is poorly understood. Pre-clinical studies in our laboratory have demonstrated that diabetic rats display higher levels of nicotine intravenous self-administration (IVSA) as compared to healthy controls. The goal of the present study was to examine whether the enhanced nicotine IVSA in diabetic rats is insulin mediated. To address this question, rats were allowed 23-hour access to various doses of nicotine IVSA (.03, .06, and .09 mg/kg) for 3 consecutive days at each dose. Following baseline intake, rats were made diabetic via streptozotocin (STZ) administration, a drug that is toxic to the insulin producing cells of the pancreas. Half of the rats then received insulin replacement via insulin pellets for the remainder of the study. Following sham surgery or insulin replacement, the rats were given re-access to the same dose regimen of nicotine IVSA. Our preliminary results revealed that regardless of STZ treatment, the rats displayed higher nicotine intake at the lowest dose of nicotine IVSA. STZ-treated rats displayed a modest increase in nicotine intake that was not reversed by insulin replacement. An important finding was that nicotine IVSA appeared to protect the rats from hyperglycemia induced by STZ. Thus, future studies are needed to more carefully assess the role of insulin in a model of nicotine intake in diabetic rats. This work was supported by the SMART: MIND training grant (R25-DA033613).

Funding Source: NIH: SMART MIND training grant (R25-DA033613), NIH: MARC U-STAR (T34GM008074)

Recommended Citation:
Flores , Rodolfo ; Pipkin , Joseph ; Hinojosa , Cecilia ; Tejeda , Christian ; O'Dell , Laura . "The effects of insulin on nicotine self-administration in an animal model of diabetes " (2013). COURI Symposium Abstracts, Summer 2013, ID= 273

Northern blotting analysis of Her-2 mRNA in human breast cancer cells

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One major approach to study the biology of cancer is the analysis of messenger RNAs (mRNAs) in human cancer cell lines. We have been employing northern blotting to evaluate the levels of Her-2 mRNA expression in human breast cancer. Her-2 expression not only allows the classification of some breast cancer patients (i.e. as being Her-2 positive), but it can also elect such patients to receive anti Her-2 based therapies. We report the overexpression of Her-2 mRNA in HCC1419, a human breast cancer cell line derived from a Hispanic patient. Although, HCC1419 cells had previously been classified as Her-2 positive, the molecular mechanism for this overexpression was hitherto unknown, and our data show that it must be in part due to overexpression of the Her-2 mRNA. Indeed, Her-2 mRNA levels were 3-fold higher than those observed in MDA-MB-361 cells, a mainstay in studies using Her-2 positive human breast cancer cell lines. T47D human breast cancer cells, used as a negative control, showed no detectable Her-2 mRNA. Therefore, we have identified a possible reason for the Her-2 positivity of HCC1419 breast cancer cells. This is an important first step developing a breast cancer research center at UTEP, which will receive human breast cancer samples and to classify them for relative Her-2 positivity.

Funding Source: URI, IDR-2

Recommended Citation:
Fons , Luis ; Benson , Allyson ; Becerril , Courtney ; Miramontes , Irving ; Lerma , Natzidielly ; Parra , Karla ; Saenz , Jasmine ; Rodriguez , Cynthia ; Valenzuela , Paloma ; Francia , Giulio . "Northern blotting analysis of Her-2 mRNA in human breast cancer cells" (2013). COURI Symposium Abstracts, Summer 2013, ID= 254

In vitro and In vivo analysis of breast cancer cell lines

Alejandra E Gallegos[1^], Cynthia A Reyes[2^], Paloma A Valenzuela[2], Karla Parra[2], Natzidielly Lerma[2], Courtney Becerril[2], Cynthia M Rodriguez[2], Giulio Francia[2*]

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Our lab uses a panel of breast cancer cell line models to study the biology of this disease. We report our Western blotting analysis of protein expression levels of cancer associated genes (MLH1, MSH3, and Her-2) in breast cancer cell lines, and *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.

By Western blotting, we found that HCC1419 express high levels of Her-2 proteins relative to other breast cancer cell lines, using beta-actin as a loading control. Our results extend the observation from our colleagues who showed that HCC1419 cells overexpress Her-2 mRNA levels. We were also able to detect the expression of proteins such as MLH1 and MSH3, and although their low levels of expression complicated analysis of expression of the cells between monolayers and spheroids.

Human Her-2 positive cell lines 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-MD-361, $n=5$/group), which was increased by the addition of metronomic (20mg/kg/day) cyclophosphamide. Mouse EMT-6 breast cancer cells grew very fast in Balb/c mice immunocompetent mice, and their growth was only moderately inhibited by treatment with a metronomic cyclophosphamide protocol.

Our results also pave the way for our future experiments using in vivo models, based in implanting MDA-MB-361 tumors in immunodeficient mice and EMT-6 in Balb/c mice, to study the response of breast cancers to new anti-cancer strategies.

Funding Source: NIH

Recommended Citation:
Gallegos , Alejandra ; Reyes , Cynthia ; Valenzuela , Paloma ; Parra , Karla ; Lerma , Natzidielly ; Becerril , Courtney ; Rodriguez , Cynthia ; Francia , Giulio . "In vitro and In vivo analysis of breast cancer cell lines" (2013). COURI Symposium Abstracts, Summer 2013, ID= 260

Searching for ferroptosis in Leishmania major

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Cutaneous leishmaniasis is a vector-borne disease caused by *Leishmania major* transmitted by the bite of the phlebotomine sandfly. The disease affects millions of people throughout the world .The goal of this study is to determine whether the mechanism cell death called ferroptosis exists in *L. major.* Our research involved testing the effect of the compound Rachid (R1), known to induce ferroptosis in cancer cells. We tested R1 with concentrations ranging from 30 M to 120 M. *L. major*, transgenic promastigotes (Fielding clone V1) expressing firefly luciferase ware used to assets viability by a luciferase assay. The parasites were incubated for 72 and 96 hr., all the experiments were performed in triplicates. Positive (800 m Amphotericin B) and negative controls were included for each trial. After 72 hr. incubation little effect was showed and 96 hr., at 30 M it showed 40.64% mortality, and at 120 m for 72 hr., it showed 99 % mortality. So incrementing the dosage did kill the parasite.

Funding Source: NIH - Bridges to Baccalaureate Grant: 5R25GM049011-14.

Recommended Citation:
Garcia , Lorena ; Iniguez , Eva ; Maldonado , Rosa . "Searching for ferroptosis in Leishmania major" (2013). COURI Symposium Abstracts, Summer 2013, ID= 243

Dopamine is essential for courtship behavior in Drosophila melanogaster

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Dopamine is a neurotransmitter found in both humans and fruit flies. It plays critical roles in learning and memory as well as arousal, attention, pleasure, sexual behavior and motivation. Studies have shown that increases in dopamine enhances courtship (sexual) behavior in humans and *Drosophila*. Courtship is a complex multi-step process, which involves sensory (visual, auditory and olfactory) and motivational components. Here, we examined different roles of dopamine in male *Drosophila* courtship behavior. To do this, we paired male flies with either intact or decapitated virgin females to test courtship motivation. Specifically, we tested flies deficient in D1 receptor dDA1 (*dumb*^{2}), D2 receptor dDR2 (*dd2r*), D5 receptor DAMB (*damb*), dopamine ecdysone receptor DopEcR (*der*), and dopamine transporter DAT (*fmn*). These mutants were studied for basal courtship levels, the percent time a male spent on courting a female, and other courtship characteristics such as courtship initiation, courtship duration, copulation initiation, and copulation latency. Interestingly, previous studies found that *dumb*^{2} males are defective in courtship motivation but not other mutant males. Studies are in progress to map where D1 receptor dDA1 is essential for courtship motivation. The outcome of this study may provide important insights into specific roles that dopamine receptors mediate sexual motivation and behaviors.

Funding Source: NIH Award # 5R25GM049011-14

Enhanced rewarding effects of nicotine as assessed by place preference procedures in a rodent model of diabetes

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Previous work in our laboratory has shown that diabetic rats display an increase in nicotine self-administration and suppressed dopamine systems as compared to healthy controls. However, it is unclear if diabetic rats experience greater rewarding effects of nicotine. To address this question, we compared 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; 45 mg/kg) or vehicle. STZ is toxic to insulin-producing cells in the pancreas and produces high glucose levels of approximately 500 mg/dl. Fourteen days after diabetes induction, all rats were tested for their initial preference for 2 distinct compartments of a conditioning apparatus. The rats were conditioned 5 days later during which time the rats received an injection of saline or nicotine (0.1, 0.2, 0.4, or 0.6 mg/kg) and were placed into their initially non-preferred side. On alternate days, they received saline and were placed into the alternate side. After 8 days of conditioning, animals were retested for their preference. Our results revealed that STZ-treated rats displayed a more robust place preference for an environment paired with nicotine as compared to healthy controls. Taken together with our self-administration data, our results suggest that the rewarding effects of nicotine are enhanced in diabetic rats. Thus, diabetic patients may experience strong rewarding effects of nicotine that confer enhanced vulnerability to tobacco use.

Funding Source: National Institute on Drug Abuse

Recommended Citation:
Hinojosa , Cecilia ; Pipkin , Joseph ; Tejeda , Christian ; Flores , Rodolfo ; O'Dell , Laura . "Enhanced rewarding effects of nicotine as assessed by place preference procedures in a rodent model of diabetes" (2013). COURI Symposium Abstracts, Summer 2013, ID= 167

Cholesterol-disrupting drug nystatin blocks the migration of metastatic breast cancer cells, MDA-MB-231

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Breast cancer is the most frequently diagnosed cancer in women across the globe. Breast cancer is also the second leading cause of death among women, with estimates of more than 40,000 deaths in the US each year. Chemotherapy is the main option chosen for treatment of later stages of the disease. However, although chemotherapy can slow or stop cancer cell growth, it damages healthy cells, particularly those that divide quickly. This can cause side effects such as hair loss, nausea, fatigue, high risk of infection, and anemia. Because of this, a less harmful treatment would be preferred. This study investigates the effects of nystatin, a cholesterol-binding drug on the metastatic migration of breast cancer cells, MDA-MB-231. We hypothesized that cholesterol-enriched lipid rafts (LRs) play a critical role in the migration of breast cancer cells in culture. To test this possibility, both MCF-7 (non-invasive) and MDA-MB-231 (invasive) breast cancer cells were cultured in respective growth media in the presence and absence of nystatin (0, 1, 5, 10, 20 and 50 mM) for 24h at 37^{o}C before conducting the migration assay. We found that nystatin inhibited the migration of MDA-MB-231 cells in a dose-dependent manner and the maximum inhibition was observed at 50 mM (~43%). As expected, the non-migratory MCF-7 cells were not affected by nystatin. Although our study is still continuing, the current results indicate that cholesterol-enriched LRs could be an ideal target for developing new anti-breast cancer agents. However, more in-depth experiments are necessary to validate our observation.

Funding Source: NIH

Recommended Citation:
Hoang , Thao ; Guevara , Priscilla ; De Chatterjee , Atasi ; Das , Siddhartha . "Cholesterol-disrupting drug nystatin blocks the migration of metastatic breast cancer cells, MDA-MB-231" (2013). COURI Symposium Abstracts, Summer 2013, ID= 222

Thymidine incorporation assays of HER-2 positive breast cancer cell lines including one derived from a Hispanic patient

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Approximately twenty-five percent of human breast cancers are Her-2 positive as a result of the overexpression of this oncogene. And yet, is spite of such a prevalence, researchers worldwide only have access to one human Her-2 positive breast cancer cell line, termed HCC1419, that was derived from a Hispanic patient.

To gain further insight into the biology of breast cancer, we used thymidine incorporation assays to evaluate the response of the breast cancer cell lines to a class of compounds termed ceramide analogues. We are interested in the effect these compounds have on breast cancer since we recently found that they show excellent activity against pancreatic cancer cells (Bocci et al *Neoplasia* 2012). Thus, in our ongoing breast cancer studies, we have determined that the IC50 for the C6 ceramide analog in the human HCC1419 breast cancer cell line is around 1 micromolar. Our results were obtained using an in vitro 6-day exposure protocol with the drug.

We will present our protocol for evaluating the effects of ceramide analogs on human breast cancer cell lines. In that respect, our research will also focus on human breast cancer models (i.e. the HCC1419) that are reflective of tumors that occur in the Hispanic population.

Funding Source: URI, IDR2

Recommended Citation:
Jallad , Sarah ; Francia , Giulio ; Valenzuela , Paloma ; Parra , Karla ; Lerma , Natzidielly ; Rodriguez , Cynthia ; Spencer , Charles ; Aguilera , Renato ; Thordarson , Gudmundur ; Bocci , Guido . "Thymidine incorporation assays of HER-2 positive breast cancer cell lines including one derived from a Hispanic patient" (2013). COURI Symposium Abstracts, Summer 2013, ID= 261

Evaluation and validation of IMPs (IMP1. p62, Koc) as TAAs biomarkers in acute myelogenous leukemia (AML)

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Acute myelogenous leukemia (AML) is a fast-growing hematologic cancer. With a 5-year survival, the hope of many individuals relies in the possibility of an early detection. Previous studies have shown the possibility of the use of *tumor-associated antigens (TAAs)* as potential biomarkers in many types of cancer but very few have target to AML, *Insulin Growth Factor-II mRNA binding proteins* (IMPs) are TAAs that have been previously demonstrated to be overexpressed in many types of solid tumor. The objective of this project is to evaluate and validate IMPs as TAA biomarkers in AML. The protein is initially expressed in *E. coli*, and further purified using a nickel column chromatography. The purified recombinant IMP proteins have an optimal concentration 0.15 g/ l for IMP1, 2 g/ l for p62 and 0.3 g/ l for Koc. In the subsequent study, autoantibodies to IMPs in AML sera are detected by the Enzyme-linked Immunosorbant Assay (ELISA). Comparing normal sera against cancer sera and their reactions to the autoantibody, a spectrometer was used to quantify the positive reactions. The serum samples that were determined to contain anti-IMP autoantibodies by ELISA were further confirmed using Western Blotting. The positive sera in ELISA were also tested by indirect immunofluorescence assay. The results showed the frequency of anti-IMPs autoantibodies in AML sera was 6.8% for IMP1, 30.5% for p62 and 20.3% for Koc, respectively. Our preliminary data suggest that IMP family proteins can also induce autoimmune responses in AML, and anti-IMP autoantibodies may be used as potential biomarkers in immunodiagnosis of AML.

Funding Source: NIH

Recommended Citation:
Jaramillo , Chelsy ; Liu , Mei ; Dai , Liping ; Zhang , Jianying . "Evaluation and validation of IMPs (IMP1. p62, Koc) as TAAs biomarkers in acute myelogenous leukemia (AML)" (2013). COURI Symposium Abstracts, Summer 2013, ID= 158

Organization of hypocretin/orexin neuronal projections to the hypothalamic paraventricular nucleus in the adult male rat

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Brain circuits that control food intake have been linked to circuits controlling reward and neuroendocrine function; disruptions in such circuits can lead to obesity, metabolic and neuroendocrine disorders, and addiction. The lateral hypothalamic area (LHA) contains neurons that express the appetite-stimulating and arousal-producing peptide, hypocretin/orexin (H/O). H/O neurons in the LHA are known to project to the ventral tegmental area (VTA), a site controlling pleasurable, rewarding and addictive aspects of food and drug stimuli. Moreover, H/O neurons also send projections to the paraventricular hypothalamus (PVH), an integration site controlling neuroendocrine and pre-autonomic function. PVH neurons expressing the neuropeptides oxytocin (OT) and vasopressin (VP) also project to the VTA and indirectly stimulate the release of dopamine, a neurotransmitter important in reward-seeking behavior. Thus, H/O neurons can control VTA function both indirectly and directly. Whereas direct H/O connections to VTA neurons have been well studied, the organization of H/O projections on PVH neurons is virtually unknown. We used immunohistochemistry, wide-field fluorescence microscopy, and high-resolution atlas mapping techniques to visualize and map H/O axonal fibers innervating OT- and VP-immunoreactive neurons of the PVH in adult male rats. By consulting both Nissl and fluorescent NeuroTrace staining patterns we further mapped these H/O projections to subdivisions of the PVH using a standardized brain atlas. Our initial results indicate that H/O neurons send projections to most subdivisions of the PVH and are enriched in pre-autonomic subdivisions. This study will provide a better understanding of the organization of shared circuitry among feeding, addiction, and reward networks.

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Recommended Citation:
Kish , Eszter ; Chenausky , Sarah ; Martinez , Anais ; Khan , Arshad . "Organization of hypocretin/orexin neuronal projections to the hypothalamic paraventricular nucleus in the adult male rat" (2013). COURI Symposium Abstracts, Summer 2013, ID= 173

Homelessness in the El Paso region: counting the homeless and determining the prevalence of serious mental Illness in the homeless population

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The Point-in-Time counts of the homeless population throughout the United States, as mandated by the Department of Housing and Urban Development (HUD), focus on 1) reports from homeless shelters and 2) counts of people who are visibly homeless on the streets (U.S. Department of Housing and Urban Development, 2012). This methodology tends to undercount Hispanic homeless people as well as those who are marginally housed (Conroy & Heer, 2003). Methodologies used by HUD as well as by prior studies of homelessness also tend to over-sample those individuals with severe mental illness (Rossi, 1992; Lee, et al., 2010) and to fail to differentiate between the varying severities of mental illness (Shlay & Rossi, 1992). Building on two studies using large purposive samples of Hispanics and homeless people, a Point-in-Time replication census survey was designed to better account for the typically hidden populations of homeless people described above, as well as for symptoms and diagnosis of mental illness. The findings show that there is a significant marginally-housed/homeless population, and that homeless people report rates of mental illness similar to those of the general population, contrary to stereotypes and previous research. This study proposes improved methodologies for homeless research and sampling, as well as more precise measurements of the varying degrees of mental illness reported by respondents. It also discusses the policy implications of these findings.

Funding Source: Provost's Office

Recommended Citation:
Klassen , Jonathan ; Castaneda-Tinoco , Ernesto ; Smith , Curtis . "Homelessness in the El Paso region: counting the homeless and determining the prevalence of serious mental Illness in the homeless population" (2013). COURI Symposium Abstracts, Summer 2013, ID= 241

Changes in brain signaling mechanisms in response to stress may play a role in the development of PTSD

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Post Traumatic Stress Disorder (PTSD) is an anxiety disorder that often affects people who are exposed to traumatic situations. The consequences of PTSD are far-ranging, from its impact on the patient to the costs of healthcare for those affected. Understanding the mechanisms of PTSD will enhance our ability to treat this condition and improve the quality of life for these individuals. We exposed adult male Sprague Dawley rats to acute (A; 30min x 1d) or repeated (R; 30min x 14d) restraint stress, and compared them to non-stressed controls (C). Perfused brain sections 30 m thick were stained immunohistochemically, using fluorescence-based or colorimetric methods, for proteins related to PTSD. Specifically, we determined the number and distribution of neurons in relevant brain regions that express the calcium-binding proteins Calbindin (CB) and calcium/calmodulin-dependent protein kinase II (CamKII). These protein markers designate neurons as inhibitory (utilizing the gamma-aminobutyric acid [GABA] neurotransmitter) or excitatory (using the neurotransmitter glutamate), respectively. Next, we determined the level of activation of these types of neurons by staining for the Fos protein and quantifying the number of cells expressing, Fos alone, CB or CamKII alone, or both markers. Brain areas of interest, identified by Nissl staining, were the paratenial nucleus, the piriform cortex, and the hippocampus. Preliminary results have identified populations of CB neurons that do not appear to be stress-sensitive, while others were activated by acute stress exposure. Data on CamKII staining is underway, and how our findings relate to possible mechanisms of PTSD will be discussed.

Funding Source: NIH

Recommended Citation:
Lodoza , Gabriel ; Bolanos , Juan ; Saenz , Ryan ; Hamdan , Jameel ; Darcy , Christina ; Diaz , Benjamin ; Gosselink , Kristin . "Changes in brain signaling mechanisms in response to stress may play a role in the development of PTSD" (2013). COURI Symposium Abstracts, Summer 2013, ID= 187

Engineered HIV-derived viruses for specific gene delivery in glycinergic neurons

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Glycine is a major inhibitory neurotransmitter predominantly localized in the central nervous system (CNS) and its extracellular levels are tightly modulated by Glycine transporters GlyT1 and GlyT2. GlyT2 is known to be a marker for inhibitory glycinergic neurons and it is juxtaposed with post-synaptic glycine receptors. Although GlyT2 is essential for animal survival and regulation of multiple sensory and motor functions, little is known about the location of glycinergic circuits and their projections in the brain. We aim to address this problem by engineering a virus expressing two genes, the GlyT2 transporter and the fluorescent protein mCherry as a reporter protein. This lentiviral vector will be packaged and used to infect neurons in different brain regions for neuronal tracing experiments and identification of glycinergic circuits. A better understanding of the precise localization of glycinergic circuits would lead to development of novel therapeutic interventions against neuromotor disorders like Hyperekplexia.

Funding Source: Smart mind program

Recommended Citation:
Lopez , Ashley ; Cuevas , Hector ; Seong , Changsoo ; Miranda , Manuel . "Engineered HIV-derived viruses for specific gene delivery in glycinergic neurons" (2013). COURI Symposium Abstracts, Summer 2013, ID= 148

Identifying imposters: An analysis of the calibration between confidence an accuracy in cross-race face perception

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While identification of suspected imposters by law enforcement would be difficult under the best of circumstances, research has demonstrated that identification of individuals of another, less familiar race or ethnicity is significantly more difficult when compared with performance on own-race faces. Known as the cross-race effect (CRE), this phenomenon has received over 40 years of psychological research and been demonstrated in a variety of experimental and field contexts. Given the relevance of this phenomenon to national security issues an experiment was conducted to better understand how well transportation document screeners may be able to determine whether a given photograph (from a Passport or ID card) matches the identity of the person tendering the card, and if the CRE occurs during this task. Further we investigated how well confidence in screeners' identification ability is calibrated with their actual accuracy. Using a national sample of participants from three different racial/ethnic groups (i.e., Mexican-American, African-American, & Caucasian), our results indicated that participants showed greater identification accuracy for pairing an ID photo with the tendering traveler, when the traveler came from the screeners' own-race/ethnicity. Further, results indicated that participants were over-confident in their abilities, especially for unfamiliar racial or ethnic face pairings. Theoretical and practical implications of cross-race face perception as it applies to enhancing the identification of imposters, while reducing mistaken identification of innocent persons, will be discussed.

Funding Source: Department of Homeland Securty

Recommended Citation:
Martinez , Nahomi ; Susa , Kyle . "Identifying imposters: An analysis of the calibration between confidence an accuracy in cross-race face perception" (2013). COURI Symposium Abstracts, Summer 2013, ID= 233

Understanding interaction in cross-functional teams

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Cross-functional teams often enhance the development of new products and ideas. They comprise several individuals with varying skills, expertise, responsibilities, education, and professional backgrounds. This research project aims to increase the effectiveness of interactions in cross-functional teams by identifying differences in interaction styles between engineers and business or non-engineering team members. Earlier research has involved latent semantic analysis, which examines the similarity of words. In this project, we will study the role of conversational initiative, which means who takes the lead in the interaction, how and if acceptance and grounding occur, which examines how conversants indicate to each other that they have understood what has been said, the role rapport plays in communication, which means the extent to which people feel “in sync” with each other, and the view of self-importance due to one’s identity. The data will be obtained by recording meeting sessions of cross-functional teams, a survey that each team member will fill out, and group debriefings where the team is split up by engineering and non-engineering team members. We expect that the results of this study will provide information on how cross-functional team members interact with one another. This knowledge may allow us to create interfaces to represent and aid the communication among them. Future research could include determining how to represent the interaction styles computationally for use in embodied conversational agents (ECAs).

Recommended Citation:
Myers , Keicha ; Martinez , Angelica ; Gris , Ivan ; Novick , David . "Understanding interaction in cross-functional teams" (2013). COURI Symposium Abstracts, Summer 2013, ID= 98

Nitrosative stress-induced neurodegenerative disorders prevented by psoralidin intervention

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Drug abuse results in increased ROS production. Nitrosative stress, an example of increased ROS, is in turn associated with the pathogenesis of a sporadic variant of Parkinson's (PD) and Alzheimer's (AD) diseases. In essence, the redox activity of protein disulfide isomerase, a chaperone that catalyzes maturation of disulfide-bond-containing proteins, gets disrupted in response to nitrosative stress. This leads to accumulation of misfolded protein debris inside the cytosol resulting in AD and PD as discussed above. Studies were performed to determine whether the phytochemical psoralidin can protect Protein disulfide isomerase activity under nitrosative stress. For the in vitro experiments, tetranitromethane and Fenton chemistry were used as model ROS generators. S-nitrosylation was evaluated by Mass spectroscopy. In vivo, cytotoxicity assay of rotenone and psoralidin was evaluated on dopaminergic cell lines prior to analyses for neuroprotective efficacy of the phytopharmocophore. Confocal microscopy techniques were employed to examine the impact of rotenone and psoralidin on the expression of GFP tagged synphylin-1 protein. The results from these studies are discussed.

Funding Source: Alzheimer's Disease Research Foundation, National Institute on Drug Abuse

Recommended Citation:
Negron , Gabriela ; Marín , José ; Kabiraj , Parijat ; Varela , Armando ; Narayan , Mahesh . "Nitrosative stress-induced neurodegenerative disorders prevented by psoralidin intervention " (2013). COURI Symposium Abstracts, Summer 2013, ID= 256

Detection of parasites in ancient Native American coprolites from Sierra Diablo Cave

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In June of 2011, Sierra Diablo Cave (Texas) was excavated by Dr. David Carmichael and his field school team. Multiple coprolites were found, and initial on-site examination of coprolites indicated human origin and parasitic presence within. Students in an archeological lab methods class wetted a small portion of one coprolite, and witnessed the hatching of possible pinworms (*Enterobius vermicularis*). Several parasites may be found in each human coprolite, requiring careful microscopy for initial identification of eggs, cysts, and parasites, and multiplex PCR analysis later for DNA identification. Coprolites have the outer layer removed by dusting, are subjected to UV light on all sides, and the core is ground. The coprolite material is then reconstituted using a 0.5% trisodium phosphate solution, filtered through a series of brass screens, and all portions carefully examined using light microscopy for the presence of eggs, cysts, and portions of adult parasites. Identification will be based on known morphological characteristics. Some major parasites that are expected due to historical evidence of their presence in coprolites are *Enterobius vermicularis, Ascaris lumbricoides, Entamoeba histolytica, Trichuris trichiura, Taenia* species, *Giardia lamblia*, and *Necator americanus*. A molecular approach will be taken in the very near future, using multiplex PCR methods to identify multiple parasites in a single reaction. Results will be compared to modern DNA, furthering knowledge of parasite history. This project is cross-disciplinary and will further the research efforts of both the Biology and Anthropology departments.

Funding Source: Provost's Summer Student Research Assistant Program

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Recommended Citation:
Payne , Sonja ; Maldonado-Medina , Rosa ; Carmichael , David . "Detection of parasites in ancient Native American coprolites from Sierra Diablo Cave" (2013). COURI Symposium Abstracts, Summer 2013, ID= 226

Cytotoxic effects of acylated hydroquinones on selective lymphoid cell lines

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Leukemia/lymphoma malignant tumors developing in the blood and bone marrow are one of many causes of cancer deaths. Treatment options often include chemotherapy, which produces major side effects. Novel therapies are needed to improve patient's quality of life, and contribute to the field of anti-cancer drug discovery. Hence, the main goal of this study was to identify the cytotoxic effects of newly synthesized acylated hydroquinones on selective lymphoid cancer cells. Exposing a reaction mixture of 1,4-benzo or naphtho quinone with an aldehyde to direct sunlight gave acylated hydroquinones. Seven acylated hydroquinones were tested on a panel of human leukemia/lymphoma cell lines and compared to a normal cell line. A high-throughput screening (HTS) assay was used to quantify cell viability via an enzymatic assay. Initially, the mode of cell death was elucidated by flow cytometry after staining cells with annexing V-FITC and Propidium Iodine. Subsequently these results were confirmed by mitochondrial depolarization and caspase-3 activation. Several acylated hydroquinones exhibited selective cytotoxic effects on lymphoma/leukemia cells as compared to normal cell lines. The induced mode of cell death by acylated hydroquinone which has a long alkyl chain on the acyl group was found to be via apoptosis, evidenced by phosphatidylserine externalization in CEM cells. Furthermore, the compound also provoked depolarization of mitochondria and activation of its downstream effector, caspase-3, thus implicating the intrinsic apoptotic pathway as its mechanism to exert cytotoxicity. Our future goals are to identify in more detail the biochemical pathways used by this compound.

Recommended Citation:
Pedroza , Diego ; De Leon , Fernando ; Varela-Ramirez , Armando ; Lema , Carolina ; Aguilera , Renato ; Mito , Shizue . "Cytotoxic effects of acylated hydroquinones on selective lymphoid cell lines" (2013). COURI Symposium Abstracts, Summer 2013, ID= 221

Crossing borders and modern-day slavery: Human trafficking in the U.S./Mexico border region

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Human trafficking is a global problem. This paper focuses on this problem as it occurs on the U.S.-Mexico border, in particular, on the El Paso-Ciudad Juarez corridor. This region has an important human trafficking activity but the main problem is the difficulty of counting and mapping an activity that is explicitly hidden from public view. To partly overcome this, we interview former-victims of human trafficking. A furthermore complication is that current definitions cannot be clear-cut, for example, human trafficking is often hard to differentiate from human smuggling. The common mischaracterizations of victims of human trafficking as participating in human smuggling can sometimes define the victims of human trafficking as criminals that voluntarily decided to cross the border through illegal channels. This paper discusses the different types of human trafficking along a continuum, including labor exploitation, entrapment by immigration regulations, structural trafficking, domestic abuse of foreign-born individuals, and sex trafficking. This paper describes several cases of former victims on both sides of the border; the data was collected through in-depth interviews with former human trafficking victims living in shelters in undisclosed locations. Their stories were documented while protecting the victims' identity. The data was then analyzed to highlight the theoretical significance of the differences and commonalities between the experiences of human trafficking victims and the participants in human smuggling.

Recommended Citation:
Ramos Gomez , Alejandra ; Castaneda , Ernesto . "Crossing borders and modern-day slavery: Human trafficking in the U.S./Mexico border region" (2013). COURI Symposium Abstracts, Summer 2013, ID= 265

Alcohol and methamphetamine inhibit neurite outgrowth and cause neurodegeneration by altering G betagamma-microtubule association in PC12 cell model

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G betagamma, an important component of G protein-coupled receptor (GPCR) signaling plays an important role in alcohol (ethanol, EtOH) addiction and relapse. Alcohol exposure is associated with changes in brain function and degenerative processes. We have shown earlier that G betagamma induces neuronal outgrowth and differentiation by interacting with microtubules (MTs), and disruption of this interaction inhibits neurite outgrowth and causes neurodegeneration. To understand the mechanism of action of EtOH, in the present study we investigated whether EtOH interferes with G betagamma-MT association and causes neurodegeneration. Pheochromocytoma (PC12) cells were used to conduct the study because they respond to nerve growth factor (NGF) and exhibit a typical phenotype of neuronal cells sending out neurites. PC12 cells were treated with NGF over the course of three days, followed by overnight treatment with 100mM EtOH. In addition, we also used methamphetamine (40 M), another widely used drug of abuse in this study. The role of EtOH and methamphetamine was evaluated by confocal microscopy, subcellular fractionation and immunoblotting. Confocal microscopic analysis revealed that both EtOH and methamphetamine inhibited neurite outgrowth, disrupted MTs, and induced cellular degeneration. G betagamma-MT association was also altered in the presence of the EtOH and methamphetamine as demonstrated by both confocal microscopic analysis and immunoblotting. Our result suggests that both EtOH and methamphetamine alter G betagamma-MT association and cause neurodegeneration. Future investigation will be needed to understand how the alteration in G betagamma-MT association (as observed in the presence of EtOH and methamphetamine) is linked to drug addiction and relapse.

Funding Source: National Institute on Drug Abuse

Recommended Citation:
Reyes , Arsenio ; Sierra-Fonseca , Jorge ; Roychowdhury , Sukla . "Alcohol and methamphetamine inhibit neurite outgrowth and cause neurodegeneration by altering G betagamma-microtubule association in PC12 cell model " (2013). COURI Symposium Abstracts, Summer 2013, ID= 218

Economic security for Hispanics on the border: Mobility, poverty, and structural assimilation among Hispanics on the Texas-Mexico border

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This paper examines several key issues related to poverty, social mobility, and the incorporation of Hispanics to American society, using original quantitative and qualitative data collected in 2011 and 2012. The dataset includes detailed information on 1,152 Hispanics living in El Paso, Texas, collected through an ethno-survey. Participants were purposively selected by a multistage stratification process in order to represent El Paso in terms of gender, age, and geographic distribution according to the 2010 U.S. Census. The survey is consisted of 168 questions on migration histories, socio-demographic characteristics, transnational practices, income, service utilization, measured and self-reported data on physical and mental health, ethnic identity and pride, housing or the lack thereof, social networks, profession, and educational level, among other social indicators. From this data, we construct a complex profile of the socio-economic status (SES), feeling of security, ethnic self-identification, health, and general wellbeing of Hispanics. After analyzing these variables we can begin to understand (a) social and economic mobility of Hispanics across immigrant generations, (b) the health of Hispanics in relation to SES, and (c) key trends in Hispanic poverty, inequality, and social service use along the U.S./Mexico border, an area that has experienced some of the largest population and economic growth rates in the country in recent decades. This paper is part of a growing set of analyses arising from this large data set, which could eventually contribute to public policy solutions addressing Hispanic poverty, health, security, and wellbeing.

Word Count: 240

Funding Source: National Center for Border Security and Immigration (Dept. of Homeland Security), HHDRC Castaneda T

Recommended Citation:
Rhodes , Annie ; Castañeda , Ernesto . "Economic security for Hispanics on the border: Mobility, poverty, and structural assimilation among Hispanics on the Texas-Mexico border" (2013). COURI Symposium Abstracts, Summer 2013, ID= 239

JAK3: Not just another kinase target for leukemia and lymphoma therapy

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Janus tyrosine kinase 3 (JAK3) has been shown to play a key role in leukemia and lymphoma tumor cell growth. Jak3 has been identified as a promising target for cancer therapy due to its exclusive expression in hematopoietic cells, thus reducing the negative side effects associated with current cancer treatments. In this study, we have tested the small-molecule JAK3 inhibitors, NC1153 and CP690,555 as anti-cancer therapeutic compounds. The activation status of Jak3 within various leukemia cell lines was determined by immunoprecipitation and Western blot analysis. Multiplex analysis was used to assess the activation of Jak3 substrates including Stat3 and Stat5 within these cells. Human peripheral blood mononuclear cells (hPBMCs) and human leukemic cell lines were treated with increasing concentrations of NC1153 and CP690,555 for 72 hours and cell viability was determined by MTS assay. We report that Jak3 inhibitors preferentially inhibited JAK3-dependent T-cell lines but not cells that do not express JAK3. Finally, we demonstrated that the Jak3 inhibitors caused cell death in a dose-dependent manner. Our results indicate that NC1153 and CP690,555 disrupt leukemia and lymphoma tumor cell growth in vitro. Taken together, this study is supportive of the therapeutic potential of Jak3 for the treatment of hematopoietic malignancies.

Funding Source: National Institutes of Health, Border Biomedical Research Center Grant

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Recommended Citation:
Rivera-Peterson , Victoria ; Rodriguez , Georgialina ; Kirken , Robert . "JAK3: Not just another kinase target for leukemia and lymphoma therapy" (2013). COURI Symposium Abstracts, Summer 2013, ID= 246

Early College High School - The importance of internships and study abroad to employers

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Landing a job in this tough economy is not easy, especially for college students and recent grads. Preliminary findings show that internships have become the "new interview" in the job search process for students and employers alike. The Early College High School Program is an approach based on the principle that academic rigor, combined with the opportunity to save time and money, is a great motivator for students to meet further intellectual challenges. So, the big question is: What´s more important, education or work experience? It is found that most employers believe relevant work experience is the most important factor in their hiring decision – far more significant than strong academic performance. The researchers conducted a survey asking six ECHS graduates their opinion over a variety of questions. On one question asking whether they believe that internships and studying abroad is important for their future, every student answered "Yes", although the majority of students answered "No" when asked whether they have had an internship in the past. It is hypothesized that either participating in Internships or Study Abroad can become overwhelming for ECHS students while juggling high school and college courses or that they are simply not exposed to them while they´re in high school. The researchers will determine the reason why the majority of Early College students are not participating in Internships or Study abroad, while knowing of their importance, and will propose alternatives to improve participation.

Funding Source: Provost Office

Recommended Citation:
Rodriguez , Beatriz ; Morales , Trinidad . "Early College High School - The importance of internships and study abroad to employers " (2013). COURI Symposium Abstracts, Summer 2013, ID= 274

Effects of stress on methamphetamine self-administration in rats

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Stress is a major factor in drug use, contributing to both the development of addiction and the risk of relapse in recovering addicts. The biological effectors of these stress-related effects, however, are not fully known. To determine the effects of stress on different neurological pathways and mechanisms, and how they influence susceptibility to methamphetamine use, we used a restraint stress model and tested for changes in reward-associated molecules in the brain. Adult and adolescent male Wistar rats were subjected to acute (A: 30min x 1 d) or repeated (R: 30min x 14d) restraint, and compared to unstressed controls (C). Stress was carried out near the beginning of the light cycle (0830). Series of perfused brain sections (30 m) were stained immunohistochemically for Fos in the paraventricular nucleus of the hypothalamus (PVH) and the nucleus accumbens (NAc) shell and core. Western blotting will also be conducted to quantify the levels of tyrosine hydroxylase (TH), dopamine transporter (DAT), and dopamine receptor 2 (D2). Preliminary results show that the highest number of Fos-expressing neurons occurs in A animals in the PVH and the NAc shell and core, suggesting that stressed animals have a higher activation of key neural regulatory nuclei associated with both stress and addiction that could contribute to a greater susceptibility to methamphetamine use. Understanding stress and methamphetamine interactions will aid in the development of treatment and prevention strategies for substance abuse and other related conditions.

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Recommended Citation:
Saenz , Ryan ; Diaz , Benjamin ; Bolanos , Juan ; Hamdan , Jameel ; Barron , Kristina ; Lodoza , Gabriel ; D'Arsy , Christina ; Gosselink , Kristin . "Effects of stress on methamphetamine self-administration in rats" (2013). COURI Symposium Abstracts, Summer 2013, ID= 100

Inhibition of glycine transporters activity by the venom from Chihuahuan Dessert rattlesnakes

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Glycine is the smallest amino acid and also a building block of proteins. In addition, in the central nervous system it functions as an essential neurotransmitter. The functions of glycine as neurotransmitter include the regulation of several rhythmic movements and a variety of sensory functions such as pain. The duration and intensity of glycinergic neurotransmission is tightly regulated by the action of the glycine transporters 1 (GlyT1) and 2 (GlyT2), which clear the neurotransmitter from the extracellular space to terminate neurotransmission.

Some components of the snake venom function as neurotoxins and are commonly used for hunting and self-defense. These neurotoxins are well-known by inhibiting the activity of a variety of proteins including sodium and potassium channels, as well as many receptors and enzymes in the CNS. In this study, we examined the effect of the venom from two species of rattlesnake (*Crotalus scutulatus* & *Crotalus horridus*) on glycine uptake of GlyT1 and GlyT2. The results, using a variety of venom concentrations, suggest inhibition of uptake in a concentration-dependent fashion for both species. Whether the venom inhibits in a competitive or non-competitive fashion is something that needs to be explored in future experiments.

Funding Source: NIH Award #5R25GM049011-14

Recommended Citation:
Saucedo , Abel ; Miranda-Arango , Manuel . "Inhibition of glycine transporters activity by the venom from Chihuahuan Dessert rattlesnakes" (2013). COURI Symposium Abstracts, Summer 2013, ID= 230

What is the role of NKT cells in Francisella tularensis immunity?

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What if your immune response against an infection caused your death? *Francisella tularensis* is an emerging pathogen stimulating an overactive pro-inflammatory response from the immune system leading to death of the host. By PCR using *F. tularensis*-specific primers (RD1) and antibody staining specific for *F. tularensis*, we confirmed our bacteria as *F. tularensis*. In addition, mice infected with a dose of $1x10^6$ bacteria resulted in 50% lethality as expected for *F. tularensis*. Moreover, serum cytokine analysis showed high pro-inflammatory cytokine production consistent with the overactive immune response in response to *F. tularensis* infection. Therefore, we can conclude that this bacterium is *F. tularensis* and now seek to control the immune response against it. Natural Killer T (NKT) cells are a subset of white blood cells with both pro-inflammatory and regulatory functions that could potentially control this lethal response. Previous data suggest that NKT cells appear to regulate the over active immune response to *F. tularensis*. Therefore, the pro-inflammatory cytokine response of *in vitro* co-cultures of *F. tularensis*-infected macrophages and mouse spleen cells was compared in the presence and absence of NKT cells. These data demonstrate the regulatory role of NKT cells in the *F. tularensis*-directed immune response and will allow for focused *in vivo* experiments in the coming months. Activating NKT cells may attack and destroy the bacterial infection while preventing an overactive cytokine response culminating in reduced lethality. Ultimately, these investigations will lead to a better understanding of the role of NKT cells in this and other pro-inflammatory infections.

Funding Source: NIH

Recommended Citation:
Setzu , Nicole ; Spencer , Charles ; Ramos , Mireya . "What is the role of NKT cells in Francisella tularensis immunity?" (2013). COURI Symposium Abstracts, Summer 2013, ID= 153

Reconnaissance of possible mosquito vectors for arthropod-borne viruses in El Paso, TX

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This study is a continuation of a project to identify potential mosquito vectors for West Nile and Dengue viruses as well as their distribution and population density in El Paso TX area. Several arthropod-borne viral diseases are zoonotic/endemic in the El Paso Community, including St. Louis encephalitis (SLE), Western equine encephalitis (WEE), and West Nile encephalitis (WNE). Among these viruses, WNE is the only known arthropod-borne virus that causes human disease in the El Paso and Juarez communities. Since 2004, approximately 25 to 30 cases of WNE have been reported every year in El Paso: with most cases reported among children and the elderly. The primary vectors of West Nile virus are *Culex* mosquitoes, including *Culex tarsalis* and *Culex quinquefaciatus* which are found in the El Paso and Juarez, Mexico area. We also examined the distribution and population density of *Aedes aegypti* in El Paso. *Aedes* is the primary vector of dengue viruses that are found throughout the tropical and subtropical regions of the world. Cases of dengue have occurred in communities along the USA-Mexico border. Mosquitoes were collected throughout El Paso County using Carbon Dioxide baited light traps. Through this study we expect to allow the development of more effective diagnostic assays, more efficient and rapid diagnoses of clinical illnesses and development of potential disease control measures.

Funding Source: NIH

Recommended Citation:
Soliz , Albert ; Crews , Cindy ; Sewell , Lee ; Watts , Douglas . "Reconnaissance of possible mosquito vectors for arthropod-borne viruses in El Paso, TX" (2013). COURI Symposium Abstracts, Summer 2013, ID= 217

Activation of stress systems in the nucleus accumbens (NAcc) enhances anxiety-like behavior produced by nicotine withdrawal in female versus male rats

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The current smoking cessation medications focus on alleviating negative affective states produced by nicotine withdrawal. Although women are more susceptible to tobacco use, it is unclear whether females experience more anxiety during withdrawal than men. Work in our laboratory has shown that female rats display an increase in the expression of stress-associated genes in the NAcc, a brain region that has been shown to modulate nicotine addiction. Corticotropin releasing factor (CRF) is a neurohormone that is increased by stress. The goal of this study was to functionally validate these observed differences in CRF gene expression in the NAcc. Rats were surgically implanted with bilateral guide cannula into the NAcc and an osmotic pump that delivered nicotine for 14 days. On the test day, rats received intra-NAcc administration of saline or CRF (0.5 g) and then they received systemic administration of saline or the nicotine receptor antagonist mecamylamine (1.5 mg/kg) to precipitate withdrawal. The rats were then tested for anxiety-like behavior on the elevated plus maze. The results revealed that females displayed a larger increase in anxiety-like behavior during nicotine withdrawal than males. Females also displayed a larger facilitation of this effect following intra-NAcc administration of CRF. These results suggest that females display greater anxiety during nicotine withdrawal than males. Also, our results suggest that CRF systems in the NAcc play an important role in modulating sex differences during withdrawal.

Funding Source: National Institute on Drug Abuse award #R25-DA033613

Recommended Citation:
Tejeda , Christian ; Pipkin , Joseph ; Flores , Rodolfo ; Hinojosa , Cecilia ; O'Dell , Laura . "Activation of stress systems in the nucleus accumbens (NAcc) enhances anxiety-like behavior produced by nicotine withdrawal in female versus male rats" (2013). COURI Symposium Abstracts, Summer 2013, ID= 250

A fundamental study to understand disengagement by dorsal striatal function: dopamine and habits

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Drug dependence is the transition from recreational drug use to compulsive behaviors that eventually becomes habit. This idea suggests that drug addicts have problems “terminating” compulsive behaviors once they are turned into addictive habits. Interestingly, one study has suggested that dopamine (DA) in Basal Ganglia circuitry, specifically the nigrostriatal pathway, regulates engagement ("starting") and disengagement ("stopping") of movement in rats. It has been suggested that parallel prefrontal cortex Basal Ganglia loops modulate transitions in drug users from recreational, sporadic patterns to relentlessly habitual patterns that are driven by limbic-related negative emotional states, accumbens shell-mediated stimulant reinforcement, accumbens core-mediated conditioned reinforcement, and striatum-driven motor habits. We speculate that a disengagement component in striatal function is aberrant during drug addiction. It is hypothesized that DA in the Basal Ganglia circuitry modulates “engagement” and “disengagement” of movement. To test this hypothesis we are training rats to walk both in a continuous (60 min, 11 m/min) and discontinuous (30 sec walk/15 sec rest) fashion. During treadmill walking in vivo intracerebral microdialysis sampling for DA and its metabolites (DOPAC, HVA) are collected. Dialysate is subsequently assayed using high pressure liquid chromatography (HPLC) with electrochemical detection. We predict that DA utilization will be greater during discontinuous treadmill walking (repetitive engage/disengage behavior). If these results are found, our hypothesis that DA normally modulates the engagement and disengagement of movement will be supported. Such findings will provide a rationale for future studies investigating the disruption of executive control by DA during the relentless motor habits of drug addiction.

Funding Source: NIDA: SMART MIND training grant (R25-DA033613).

Recommended Citation:
Vazquez , Ricardo ; Terminel , Mabel ; Hernandez , Alice ; Ramos , Jeremiah ; Castaneda , Edward . "A fundamental study to understand disengagement by dorsal striatal function: dopamine and habits" (2013). COURI Symposium Abstracts, Summer 2013, ID= 278

Engineering of a plasmid expressing the GlyT2 and NSF under single CMV promoter

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Irregular mutations and malfunction of Glycine Transporter 2 (GlyT2) in the CNS can lead to a condition called Hyperkplexia, caused by slow clearance of the neurotransmitter glycine. These mutations along the GlyT2 sequence can disrupt the interaction of the transporter with interacting proteins such as the *N*-Ethylemaleimide Sensitive Fusion (NSF). It is known that NSF is an essential catalyst for vesicle fusion and works with SNARE's protein complexes to allow synaptic vesicles to fuse with the neuronal cell membrane. Based in preliminary experiments that suggest an interaction of GlyT2 with NSF, we hypothesize that NSF protein works in tandem with a domain within GlyT2 to regulate trafficking and activity. To express both proteins under control of a single CMV promoter, we are cloning GlyT2 and NSF in tandem and separated by a viral internal ribosome entry site. This genetic construct will allow us to express both proteins at similar levels and analyze the interaction in model cells. Validation of this construct is in progress.

Funding Source: NIH

Recommended Citation:
Vazquez-Perez , Jonathan ; Lopez , Ashley ; Miranda-Arango , Manuel . "Engineering of a plasmid expressing the GlyT2 and NSF under single CMV promoter" (2013). COURI Symposium Abstracts, Summer 2013, ID= 224

Development of molecular probes to study the biology of the Her-2 gene in breast cancer

Oscar G Veloz^, Crystal M Scott^, Natzidielly Lerma, Chantal Vidal , Courtney L Becerril, Irving Miramontes, Karla Parra, Paloma Valenzuela, Cynthia Rodriguez, Giulio Francia*

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Our laboratory is interested in determining the Her-2 status of breast cancer samples. Her-2 positivity is important in the prognosis of breast cancer patients, and it is an eligibility requirement for patients to receive anti-Her-2 based therapies. To optimize our protocols for the detection of Her-2, we set up bacterial plasmid growth and purification, as well as the evaluation of different Her-2 probes. By restriction enzyme analysis of Her-2 carrying plasmids we defined a 'large' Her-2 probe (1.8kb) as well as a 'small' (0.7kb) probe. Our analysis by northern blotting indicates that the 'large' probe was 3-fold more effective at detecting Her-2 mRNA expression in MDA-MB-361 human breast cancer cell lines. Thus, detection of Her-2 overexpression occurs within 1 hour of exposure of northern blots – assayed using 32P-dCTP labeled probes – containing 15 micrograms of total RNA from Her-2 positive human breast cancer cells. We also used PCR to amplify both Her-2 cDNA and Her-2 genomic DNA for the generation of additional Her-2 probes, including (intron-encompassing) genomic probes to test for Her-2 gene amplification. Our preliminary results also suggest that we have isolated probes that can be effectively used for Southern blotting genomic Her-2. This project has therefore generated effective reagents for our subsequent analysis of Her-2 positivity in human clinical samples.

Funding Source: URI,IDR-2

Recommended Citation:
Veloz , Oscar ; Scott , Crystal ; Lerma , Natzidielly ; Vidal , Chantal ; Becerril , Courtney ; Miramontes , Irving ; Parra , Karla ; Valenzuela , Paloma ; Rodriguez , Cynthia ; Francia , Giulio . "Development of molecular probes to study the biology of the Her-2 gene in breast cancer" (2013). COURI Symposium Abstracts, Summer 2013, ID= 257

The role of dopamine D2 receptor in brain development and ethanol-induced behavioral disinhibition

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In humans, substance abuse is regulated in part by dopaminergic pathways in the hippocampus involved in associative memory. The mushroom body in *Drosophila melanogaster* is a functional analog to the hippocampus that acts as a good model because of the transgenic resources available. We found that overexpression of dopamine D2 receptor dD2R in the mushroom body causes structural defects in adulthood and changes the effects that addictive substances such as alcohol have on behavioral disinhibition. This indicates that dD2R may play a key role in the functional development of the mushroom body. In *Drosophila*, there are three major D2 receptor isoforms dD2R-461, dD2R-506, and dD2R-606. This project aims to clarify the contribution of each isoform in development and physiological functions. This was done by differentially overexpressing each of the three D2 isoforms in all or specific regions of the mushroom body to identify corresponding structural phenotypes and the effect of these phenotypes on ethanol-induced disinhibited behaviors. Immunohistochemistry and confocal microscopy techniques were used to identify phenotypic variation in the mushroom body. FlyPub, the behavioral assay used for measure behavioral disinhibition, involved exposing male flies to 95% ethanol vapor until sedation every day for six days, and observing the number of flies exhibiting inter-male courtship. Typically, wild-type male flies do not court other male flies; however, they show a significant increase in courtship activity under the influence of ethanol. We hypothesize that changes in dD2R expression in a particular subset of the mushroom body neurons will lead to altered behavioral disinhibition.

Funding Source: The National Institute on Drug Abuse

Recommended Citation:
Youngblood , Mason ; Sabandal , Paul ; Burciaga , Jessica ; Han , Kyung-An . "The role of dopamine D2 receptor in brain development and ethanol-induced behavioral disinhibition" (2013). COURI Symposium Abstracts, Summer 2013, ID= 131

Chemistry and Biochemistry

Structural determination of the circadian rhythm protein circadian locomotors output cycles kaput (CLOCK)

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Many physiological processes in the human body fluctuate rhythmically in nearly 24 hours, which is called circadian rhythm. The consequences of long-term circadian rhythm disruption can be detrimental to our health. In human, circadian related diseases include obesity, diabetes, sleep disorders, and a higher risk of cancer. People who must be alert during late night hours, or travel long distance across multiple time zones are more susceptible to circadian rhythm disruptions. Circadian rhythm regulates our bodies' biochemical processes at the transcriptional/translational level. As atomic structure conveys molecular function, knowing the structure of the proteins involved in the process will provide a better understanding of circadian rhythms. CLOCK (circadian locomotors output cycle kaput) and ARNTL (Aryl Hydrocarbon Receptor Nuclear Translocator) interact with each other to form a heterodimer that binds to an E-box promoter region in DNA, which initiates transcription of several circadian genes and starts the circadian rhythm. Obtaining the structure of these proteins will help to understand how CLOCK interacts with ARNTL and how the heterodimer binds DNA. We will first clone the gene of CLOCK into a bacterial expression system by performing restriction enzyme digestion, ligation to vector, transformation to cell, and lastly sequence verification. We will then carry out protein expression and purification. Once a highly pure protein is obtained, crystallization trials will be set up to obtain crystals for structure determination using X-ray crystallography.

Funding Source: NIH

Recommended Citation:
Acosta , David ; Rush , Scott ; Avila , Gustavo ; Xiao , Chuan . "Structural determination of the circadian rhythm protein circadian locomotors output cycles kaput (CLOCK)" (2013). COURI Symposium Abstracts, Summer 2013, ID= 219

Synthesis of 2,1,3-benzothiadiazole functionalized triphenyl amines capable of hydrogen-bonding: small molecule models for extended hydrogen-bonded assemblies

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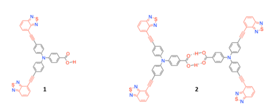
The synthesis and structural characterization of a triphenylamine (TPA) derivative functionalized with two 2,1,3-benzothiadiazole groups as electron-acceptors and a carboxylic acid functionality is presented (1, Figure 1). The -CO_2H functionality is predicted to guide the formation of hydrogen-bonded dimers of these TPA derivatives (2), which will serve as a small molecule model for larger hydrogen-bonded donor-acceptor arrays. The carboxylic acid functionality can also serve as a reaction site for attachment of alkyl chains, which can be useful for the formation of monolayers, which will be explored in the future. The power conversion efficiencies of the monomers and dimers will be determined in the future.



Funding Source: NSF

Recommended Citation:
Acosta , Rudy ; Nunez , Jose . "Synthesis of 2,1,3-benzothiadiazole functionalized triphenyl amines capable of hydrogen-bonding: small molecule models for extended hydrogen-bonded assemblies" (2013). COURI Symposium Abstracts, Summer 2013, ID= 236

Synthesis of the disaccharide Gal-1,3- Gal and its conjugation to a carrier protein

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The surface of the protozoan parasite *Trypanosoma cruzi (T. cruzi)*, the causative agent of Chagas disease, is heavily coated by glycoproteins containing highly immunogenic O-glycans. My research group has previously synthesized eleven *T. cruzi* related saccharides with either non-reducing terminal -galactosyl or -rhamnosyl moieties related to these O-glycans and conjugated them to bovine serum albumin (BSA) for the generation of a glycoarray in a microplate format. The recognition of the saccharides by antibodies was studied by chemiluminescent enzyme-linked immunosorbent assay (CL-ELISA) using pooled sera from patients with chronic Chagas disease. The study revealed the disaccharide Gal (1,3)Gal as the immunodominant glycotope, however, the study had not included the disaccharide Gal (1,3)Gal , and therefore the role played by the anomeric configuration of the reducing end sugar is not known. Here we present the synthesis of the disaccharide Gal (1,3)Gal and its conjugation to BSA for CL-ELISA studies. This disaccharide has been synthesized using known protecting group strategies, and was fully characterized using NMR spectroscopy and mass spectrometry. The disaccharide was then covalently linked to an Fmoc-protected amino acid for incorporation into a peptide, which will later be studied as a potential B-cell and T-cell epitope. This work has implications for the development of a fully synthetic carbohydrate-based vaccine, and diagnostic and chemotherapy follow-up biomarkers for Chagas disease.

Funding Source: NSF, University of Texas at El Paso, Midland College

Recommended Citation:
Anderson , Matthew ; Michael , Dr. Katja ; Schocker , Nate . "Synthesis of the disaccharide Gal-1,3- Gal and its conjugation to a carrier protein" (2013). COURI Symposium Abstracts, Summer 2013, ID= 267

Method development for bisphenol A analysis in milk using stir bar sorptive extraction-thermal desorption-gas chromatography/mass spectrometry

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Bisphenol A (BPA) is a synthetic environmental pollutant of emerging concern due to its controversial characteristics as an endocrine disruptor. Attention is raised for its accurate determination in various mediums in order to estimate the exposure to BPA and subsequent associated health risks. The goal of this study was to develop an environmentally friendly (green), sensitive, and efficient method to analyze Bisphenol A (BPA) in liquid milk samples. The technique uses Stir Bar Soprtive Extraction (SBSE) and thermal desorption accompanied with Gas Chromatography and Mass Spectrometry (GC/MS). For SBSE sample preparation, sodium carbonate (served as a pH adjustment agent), acetic acid anhydride (as a derivatization agent), mirex (as the internal standard), and a pre-conditioned stir bar were added to a 20 mL volume of sample, followed with sonication to dissolve necessary additives. After 2 hours of stirring, the stir bar was desorbed in a thermal desorption unit and BPA was analyzed by GC/MS. BPA spiked whole fat milk was used as the model sample matrix. BPA with a concentration range from 0.01 to 10 ug/L (ppb) was added to the milk sample to study the linearity and limit of detection. Different solvent systems (such as methanol) and additive effects (specifically acid, base, and EDTA) were investigated with the SBSE process to determine BPA recovery in milk samples and possible improvements for methodology.

Funding Source: National Science Foundation (NSF)

Novel fullerene-binding gels: synthesis and characterization of Zn(II) bis-N-(4-pyridyl) benzamide acrylate complex and studies of its fullerene-binding properties

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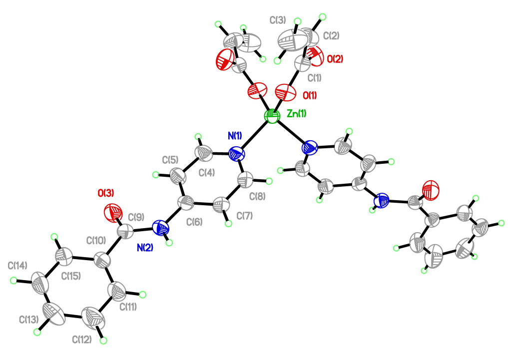
Fullerenes have been widely used in many fields due to their unique structures and properties. However, it is difficult to separate fullerenes because of their similar structure and limited solubility in common solvents, which blocks the further progression in fullerenes research. Consequently, a suitable separation technique is required to purify and separate these molecules. Herein metal complexes were developed with the ability to interact with fullerenes via - stacking interactions promoted by divalent transition metal ions. Zinc complexes were synthesized owing photo-polymerizable properties to make gels. The resulting gels were characterized by IR spectroscopy, and its binding with C60 was studied with IR and NMR spectra. Retention time of fullerenes was studied using gels derived from the Zn complex.



Funding Source: NSF

Recommended Citation:
Bahadorzadeh , Shokooh ; Marrufo , Melissa ; Metta , Alejandro ; Noveron , Juan . "Novel fullerene-binding gels: synthesis and characterization of Zn(II) bis-N-(4-pyridyl) benzamide acrylate complex and studies of its fullerene-binding properties" (2013). COURI Symposium Abstracts, Summer 2013, ID= 146

Single-molecule fullerene metallo-micelles

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Progress in solar cell technology has been impeded by two major factors, cost and energy conversion efficiency. In order to improve both of these setbacks, we have worked on coordination-polymer systems that are both cost effective and have higher energy conversion efficiency. We have developed and characterized linear coordination polymers with reversible properties that respond to redox, ligand-exchange, pH, salt, light, temperature and concentration changes in order to develop smart materials with applications in solar cell technology. Using Zinc(II) salts, alkyl-functionalized diethylenetriamine, and bridging dicarboxylate linkers, we are able to form one-dimensional coordination polymers. By extending this concept and functionalizing a (66)-phenyl-C61-butiric acid onto L-glutamic acid through acylation and amidation we have polymerized a system whose cluster size can be controlled through molar ration manipulation and introduction of capping agents. These factors, and the polymers' amphiphilic properties have lead to the creation of micelles with the purpose of controlling single-molecule cluster sizes. This is done with the purpose of controlling cluster size and testing for optimum photovoltaic efficiency.

Funding Source: NSF

Recommended Citation:
Barraza , Brian ; Islam , Md ; Noveron , Juan . "Single-molecule fullerene metallo-micelles" (2013). COURI Symposium Abstracts, Summer 2013, ID= 220

Solar cells with self-organized components: novel amphiphilic PCBM Zn(II) complexes

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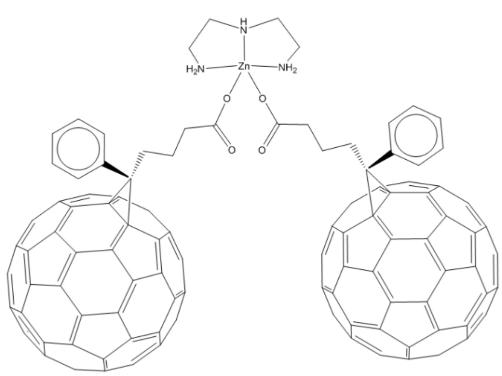
Organic solar cells and polymer solar cells are the current novelty in solar cell technology due to their photovoltaic properties. Organic solar cells are built from thin films (regularly 100 nm in thickness) of organic semiconducting compounds constituting of polymers such as polyphenylene vinylene (PV), as well as small molecule compounds like copper phthalocyanine (CuPc/ C.I. Pigment Blue 15) and carbon fullerenes and its derivatives including PCBM. The current conversion efficiency for these specific types of organic solar cells lies at approximately 10% . PCBM is the common abbreviation for [6,6]-phenyl-C_{61}-butyric acid methyl ester, a fullerene derivative with electron donor and acceptor properties (induced by the functionalized fullerene) due to its solubility in organic solvents. In this context, we prepared the Zinc(II) complex comprising diethylenetriamine and two PCBM carboxylic acid derivative groups. This new amphiphilic complex was prepared from the reaction of two equivalents of a PCBM carboxylic acid derivative [6,6]-phenyl-C_{61}-butyric acid and one equivalent of $Zn(OAc)_2$, which formed a product that was reacted with one equivalent of diethylenetriamine. Characterization was carried out with NMR, IR and Mass Spectrometry (MALDI). Self-assembly into lamellar structures was conducted with Atomic Force Microscopy, Transmission Electron Microscopy, Small-angle X-ray Scattering, and X-ray photoelectron spectroscopy. The photovoltaic properties of this complex will also be presented.



Funding Source: NSF

La@C82, a potential donor for the preparation of an all-fullerene bilayer solar cell

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Due to their unique electronic structures and interesting properties, endohedral metallofullerenes (EMFs) have potential applications in many fields. In solar cells, for example, the fullerenes electron acceptor properties are well known. However, one member of the EMF family, La@C_{82}, exhibits a very low oxidation potential, making it a candidate as a donor in a bilayer solar cell instead of an acceptor. In this work we prepared La@C_{82} in a conventional Krätschmer Huffman reactor using a La_2O_3/graphite powder mixture in a weight ratio of 1:4 under a helium atmosphere. The as-produced soot was pre-extracted with CS_2 for 2 hours and analyzed by HPLC and MALDI-TOF-MS (matrix-assisted laser desorption ionization time-of-flight mass spectrometry). The purified La@C_{82} is being used as a donor in a bilayer solar cell with C_{60} as the acceptor. If succesful, this would be the first example of a solar cell in which all electroactive components are fullerenes.

Funding Source: The National Science Foundation, the Robert A. Welch Foundation

Synthesis and characterization of dibenzo(b,f)(1,5)diazocine-6,12(5H,11H)-dione derivatives for Chameleon 2 displays

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More than one million workers in the United States have experienced, or are experiencing, Computer Vision Syndrome (CVS) which leads to eyestrain, headaches, blurred vision, dry eyes, and neck and shoulder pain. With a society where screens are common, CVS symptoms have increased to a point where people are having vision loss more often than before. Furthermore, devices such as tablets and smartphones require batteries that function longer. With an increased demand on battery improvement, but at the same time an increase in sight deficiency due to screens, new technologies that can address these two problems are needed.

Most electronic devices use emission sources which cause CVS symptoms and consume a significant amount of energy, but using absorption displays we can reduce CVS symptoms and consume less energy. Combining the concepts of conjugation and aromaticity, we propose to synthesize and characterize bent non-aromatic compounds (no absorption in the visible spectrum) that can be converted electronically to flat more conjugated aromatic compounds (absorption in the visible spectrum) and vice versa. We present progress towards this goal.

Funding Source: National Institutes of Health (NIH), Beijing Normal University

Recommended Citation:
Castillo-Marquez , Hiram ; Pan , Ziwei ; Espinosa , Tomas ; Mortazavi , Saideh ; Salvador , James . "Synthesis and characterization of dibenzo(b,f)(1,5)diazocine-6,12(5H,11H)-dione derivatives for Chameleon 2 displays" (2013). COURI Symposium Abstracts, Summer 2013, ID= 216

Novel biodegradable inks for 3-D printing

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Rapid-prototyping via stereo-lithography has attracted considerable attention due in recent years due to its ability to generate three-dimensional objects of infinite shapes derived from digital models. To date, most inks used for this additive manufacture process are based on polymers with varying degrees of biodegradability. Herein we will present a novel design for a biodegradable metal-coordination polymer in which the links are connected by transition metal ions that are easy to remove via redox- and ligand-exchange reactions. In particular, we prepared diethylenetriaminezinc(II) succinate complex that forms a coordination polymer with acrylate end caps. Subsequent photopolymerization reactions of this polymer allow us to form 3-D shapes using stereo-lithography techniques. Characterization with NMR, IR, SEM, and TEM, as well as the physical and chemical properties will be presented.

Recommended Citation:
Chavez , Andrew ; Moore , James ; Barraza , Brian ; Sanchez , Juan ; Wicker , Ryan ; Noveron , Juan . "Novel biodegradable inks for 3-D printing " (2013). COURI Symposium Abstracts, Summer 2013, ID= 242

Initialization of structural proteomic studies of the giant marine virus CroV

Jennie Choi[1^], Duer Bolotaulo[1^], Martin Chacon[1^], Sayan Chakraborty[1], Gustavo A Avila[1], Matthias G Fischer[2], Curtis A Suttle[3], Chuan Xiao[1*]

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The existence of cellular genes in nucleocytoplasmic large DNA viruses (NCLDV) such as the giant *Cafeteria roenbergensis* virus (CroV) has led to not only the redefinition of the virus but also the mystery of the origin of these genes. Information obtained from structural proteomics studies of CroV can be compared with known cellular counterparts, elucidating the evolutionary relationship between virus and cell in a three-dimensional structural aspect. Eleven key CroV genes have been chosen to be cloned, expressed, and crystallized to determine their atomic structures. CroV's major capsid protein, one minor capsid protein and one viral photolyase have been cloned into an expression vector and are currently undergoing protein expression trials. Proteins will then be purified to high homogeneity for structural studies via affinity and other chromatography techniques. Atomic structures will be determined through X-ray crystallography. Structural comparisons to homologous proteins and functional analyses of these proteins will follow to extend the proteomics study of CroV.

Recommended Citation:
Choi , Jennie ; Bolotaulo , Duer ; Chacon , Martin ; Chakraborty , Sayan ; Avila , Gustavo ; Fischer , Matthias ; Suttle , Curtis ; Xiao , Chuan . "Initialization of structural proteomic studies of the giant marine virus CroV" (2013). COURI Symposium Abstracts, Summer 2013, ID= 259

Porphyrin-based interfacial layers for organic solar cell applications

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Over the past year, improvements to organic photovoltaic (OPVs) cells have been investigated. The most commonly used interfacial layer is formed from the charged polymer poly(3,4-ethylenedioxythiophene) poly(styrenesulfonate) (PEDOT:PSS). In this project, modifications to gold (Au) and indium tin oxide (ITO) electrodes with porphyrin-based dyads as interfacial layers have been made. Two types of interfacial layers were prepared; A) fullerene-based photo-switched dyads to polarize the cell and enhance the efficiency, and B) porphyrin-based interfacial layers as an electropolymerization promoter for organized photo-active layers. In principle, when the fullerene-based photo-switched dyads are anchored properly to the electrode surfaces (A) the dyads should exhibit a polarizing effect even in their ground states. Triphenylamine (TPA)-functionalized porphyrin monolayers (B) should promote electropolymerization of TPA-based fullerene dyads to mimic the ideal photoactive layer morphology of OPV devices.

Funding Source: National Science Foundation, The Robert A. Welch Foundation

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Recommended Citation:
Couillard , Eden ; Rivera-Nazario , Danisha ; Echegoyen , Luis . "Porphyrin-based interfacial layers for organic solar cell applications" (2013). COURI Symposium Abstracts, Summer 2013, ID= 183

Synthesis and characterization of coordinatively unsaturated bimetallic units

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Coordinatively unsaturated bimetallic systems have attracted growing attention today due to their unique properties that include ultra-short metal-metal distances and high bond orders. Herein we present the synthesis of coordinatively unsaturated bimetallic units, M_2 (M = Cr, Mo, or W). Sterically demanding supporting ligands such as bis-diisopropylphenyl formamidine (HDippF) and bis-diisopropylphenyl guanidine (HDippG) are used to prevent more than two ligands to surrounding the bimetallic unit. This coordinative unsaturation contributes the potential high bond order when the appropriate electronic structure is utilized. Ditungsten and dimolybdenum coordinatively unsaturated compounds have been characterized by NMR spectroscopy and x-ray crystallography. Photo-electron spectroscopy (PES) has been conducted to probe the electronic structure of these compounds. Understanding the electronic structure of these compounds will lead to an enhanced understanding of the nature of their bonding, as well as providing further insight into possible future applications as molecular catalysts.

Funding Source: Beijing Normal University

Recommended Citation:
Duan , Tianyu ; Grajeda , Javier ; Villagran , Dino . "Synthesis and characterization of coordinatively unsaturated bimetallic units" (2013).
COURI Symposium Abstracts, Summer 2013, ID= 238

Synthesis of racemic profens

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[3] *Department of Chemistry, El Paso Community College.*

Profens are a type of non-steroidal anti-inflammatory drug (NSAID). They represent one of the most commercially successful and important classes of analgesics such as ibuprofen and naproxen. Profens are derivatives of 2-phenylpropanoic acid which contain an asymmetric center resulting in the formation of mirror image compounds called (*R)* and (*S)*- enantiomers. Although the (*S)*- enantiomer is the therapeutically effective drug, often they are sold as an equal mixture of enantiomers called a racemic mixture. For example, (S)-ibuprofen has been reported to act three times faster than its racemic mixture with fewer side effects.

Our research involves the conversion of racemic profens to (*S*)-profens. This summer we have isolated or synthesized three racemic profen mixtures. Racemic ibuprofen was isolated from commercial pills. (*S*)-Naproxen was isolated from tablets and racemized. The simplest profen, 2-phenylpropanoic acid, was synthesized by benzylic deprotonation of ethylbenzene followed by reaction with carbon dioxide. The success of each procedure is reported.

Recommended Citation:
Espinosa , Tomas ; Mortazavi , Saideh ; Pan , Ziwei ; Castillo , Hiram ; Salvador , James . "Synthesis of racemic profens" (2013). COURI Symposium Abstracts, Summer 2013, ID= 94

Effect of pro-domain on Cruzain maturation

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

Cruzain is the major cysteine proteinase of *Trypanosoma cruzi*, the parasitic protozoan causing the American Trypanosomiasis also known as Chagas disease. Chagas disease is a chronic infection caused by *Trypanosoma cruzi*, a protozoan parasite, and remains prevalent in Central and South America but is gradually making its way to other countries. Though the disease causes death in only about 25%-30% of infected patients, treatment is only effective during early onset with undesirable side effects and no vaccine has yet been discovered. New treatment is currently designed around inhibition of Cruzain, the cysteine protease that is present in all stages of the parasitic life cycle. It is considered a very promising target for chemotherapy however; no inhibitors have been approved for use as treatment for Chagas disease. There is an urgent need to develop new strategies against Cruzain. We want to study the implications of Cruzain in the prevention of Chagas disease by introducing a bottom-up approach via studying the folding mechanism of Cruzain versus inhibition of the active site. Our main goal is to determine the relationship between Procruzain (PCZN) and Cruzain (CZN) using circular dichroism spectroscopy to determine the role of the pro-domain in Cruzain maturation using thermal transition studies of both PCZN and CZN. In doing so, it will help us to delineate the impact of the pro-domain on CZN maturation. Evaluation of thermal shift direction and difference will allow us to evaluate the pro-peptide's role in folding and activation. The pro-domain is a known inhibitor for other enzymes including serine and alpha-lytic proteases. In our study, we would like to prevent the protein from gaining a three-dimensional structure, hinder its function and essentially prevent transmission of the disease and treat the disease. A novel treatment can then be studied based on our findings.

Funding Source: NSF

Recommended Citation:
Garcia , Jesus ; Romero , Marisol ; Gonzalez , Veronica ; Narayan , Mahesh . "Effect of pro-domain on Cruzain maturation" (2013). COURI Symposium Abstracts, Summer 2013, ID= 229

Synthesis of indolinone derivatives with solar reactions of quinone derivatives

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Indolinone derivatives have been known to be precursors to many pharmaceutical studies and other medicinal uses, such as the development of vitamin supplements and other drugs. Indolinone derivatives have also been applied to a wide array of industrial uses, such as the development of dyes, fragrances, and textiles. The objective of the project is to synthesize indolinone derivatives with the utilization of benzoquinone and naphthoquinone, reacted with acetamide under sunlight irradiation. The ultraviolet wavelengths utilized at ranges of 280 nm and 380 nm were factors controlled and directed by the use of Pyrex and quartz glassware. The experiment is directed by radical formation amongst the carbonyl group, produced as a result of sunlight exposure ranging from 24-hour periods, up to 6 days. Thin-Layer Chromatography (TLC) was used to monitor the progress of the reactions. The experimental trials were analyzed and confirmed by ^{1}H NMR. After data analysis, it was concluded that the reaction between acetamide and benzoquinone did not produce desirable results. The additional experimental trials conducted with different ultraviolet wavelengths, as well as the application of a diverse set of solvents including acetone, DMF, and benzene provided incentives for future work. Future reactions revolve around the utilization of amine groups and quinone derivatives with the use of alcohol solvents, which will serve as the basis of new methods to synthesize indole rings.

Recommended Citation:
Guerra , Jorge ; Saunders , Jong ; Luu , Quang ; Mito , Shizue . "Synthesis of indolinone derivatives with solar reactions of quinone derivatives" (2013). COURI Symposium Abstracts, Summer 2013, ID= 157

Investigation of donor-( )-acceptor triphenyalamine-based dyes in dye sensitized solar cells

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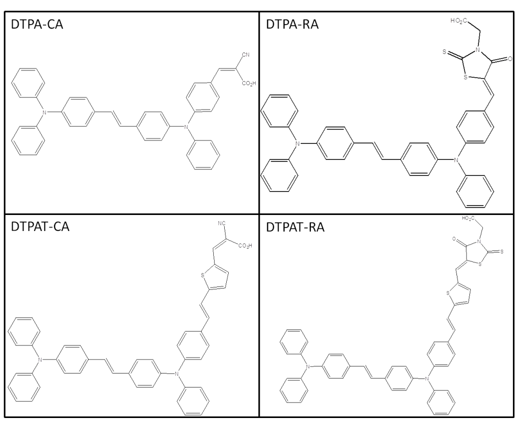
Dye sensitized solar cells (DSSCs) show great promise in the field of solar cell technology, however the most efficient cells published have been sensitized with expensive, ruthenium-based dyes. Here we test a series of organic, metal-free triphenylamine (TPA) dyes synthesized as photosensitizers for DSSC applications. These TPA-based dyes incorporate different anchoring groups and molecular linkers to improve the efficiency. The anchor groups are composed of either cyanoacrylic acid or a rhodanine-3-acetic acid; the latter is shown to be a good anchor on the TiO_2 surface and promotes a higher probability of electron injection, so it was investigated here. Additionally, by adding a thiophene linker to these dyes the efficiency can improve tremendously. The efficiency was also improved by adding a second TPA, creating a donor-(-bridge)-acceptor (D- -A) dye. Shown are the dye structures and their corresponding analogues that were investigated. These dyes were incorporated into solar cells and fully characterized by external quantum efficiency (EQE), AM1.5 solar simulation, electrical impedance spectroscopy (EIS), and UV-vis measurements.



Funding Source: Beijing Normal University, The National Science Foundation, The Robert A. Welch foundation

Recommended Citation:
Guo , Yanru ; Cotta , Robert ; Echegoyen , Luis . "Investigation of donor-( )-acceptor triphenyalamine-based dyes in dye sensitized solar cells" (2013). COURI Symposium Abstracts, Summer 2013, ID= 103

Synthesis of a photoreactive nitroindoline linker and its application in glycopeptide synthesis

Jihui Li[1^], Luis A Barrera[2], Katja Michael[2*]

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[2] *Department of Chemistry, The University of Texas at El Paso.*

It is well know that N-acyl-7-nitroindoline derivatives can acylate nucleophiles under UV light. This photoreactive property can be utilized for the synthesis of peptide amides under near -neutral conditions, avoiding undesired side reactions or loss of acid or base sensitive groups, e.g. glycosylated amino acids and/or protecting groups in peptides. The goal of this project is to synthesize N-fmoc-glycyl-5-carboxylic acid-7-nitroindoline from 5-carboxylic acid indole and utilize this compound in the synthesis of a 13mer glycopeptide. This glycopeptide has alpha-GaINAc as an O-glycan, and is a partial sequence of the tandem repeat of the cell surface glycoprotein MUC1 expressed by many human adenocarcinomas. We are currently working toward the photochemical C-terminal biotinylation of this glycopeptide, which can be accomplished following two different pathways: one involving the cleavage of the peptide from the resein followed by the photoreaction , the second involving the direct photorelease from the beads, affording both transamidation and cleavage from the resin in a single step.

Funding Source: COURI

Recommended Citation:
Li , Jihui ; Barrera , Luis ; Michael , Katja . "Synthesis of a photoreactive nitroindoline linker and its application in glycopeptide synthesis" (2013). COURI Symposium Abstracts, Summer 2013, ID= 225

Synthesis of 5,8-dihydroxy-1,4-naphthoquinone and its homologation under sunlight

Jingzhe Li^, Mengwei Yuan^, Quang H Luu, Shizue Mito*

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

5,8-Dihydroxy-1,4-naphthoquinone is used as an insecticide, nylon stabilizer and hair dye. Other similar compounds have an array of uses as well. Traditional synthesis of this compound requires complicated procedures. Furthermore, once the compound is isolated, it is difficult to introduce functional groups onto it. The aim of this study is to induce a radical reaction initiated by sunlight, using 1,4-benzoquinone and 2-butenedial. A challenge will be to overcome some limitations of the traditional approach by devising easier steps and incorporating the addition of hydroxyl groups to the structure. Right now, our main focus is on the synthesis of 2-butenedial. The oxidation reactions of unsaturated alcohols, such as 2-butyne-1,4-diol and 2-butene-1,4-diol did not give desirable results. Although having difficulty in purification, the ring-opening reaction of 2,5-dimethoxy-2,5-dihydrofuran into cis-2-butenedial indicated products formation and seems promising by spectrum data. Products were analyzed by ^{1}H-NMR to confirm formation of 2-butenedial. Different reactions are being employed to obtain pure 2-butenedial. Success in the synthesis of 2-butenedial will assure to prepare 5,8-dihydroxy-1,4-naphthoquinone, which can be used for the formation of 5,8,9,10-tetrahydroxy-anthracene-1,4-dione as well as facilitate the formation of tetra-, penta- and larger cyclic analogous structures.

Funding Source: Beijing Normal University

Recommended Citation:
Li , Jingzhe ; Yuan , Mengwei ; Luu , Quang ; Mito , Shizue . "Synthesis of 5,8-dihydroxy-1,4-naphthoquinone and its homologation under sunlight" (2013). COURI Symposium Abstracts, Summer 2013, ID= 227

Photochemical synthesis of peptide oxo-esters with minimal epimerization and development of photoactive solid support for peptide synthesis

Chenxi Liu^, Alfredo Ornelas, Katja Michael*

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Cell penetrating peptides (CPP), such as the TAT peptide from Human Immunodeficiency Virus-1, facilitate cellular uptake of various molecular cargo and have emerged as attractive drug delivery tools. The availability of a fluorescently labeled TAT peptide could benefit in the understanding of how a CPP centers a cell, and would allow us to monitor its location through fluorescence microscopy. Here we present the photochemical synthesis of a fluorescent TAT peptide by a "one-pot-two-reactions" procedure under neutral conditions. A TAT peptide with a photoactive C-terminal N-acyl-bromonitroindoline moiety is first irradiated with UV light in the presence of N-Hydroxybenzotriazole (HOBt) in an inert solvent producing an activated ester in situ. Then, a boron-dipyrromethene (BODIPY) alcohol is introduced and acylated in the dark giving a fluorescent peptide oxo-ester. Since our photochemical esterification occurs under neutral conditions, very low epimerization levels are observed (<1%) as shown in an epimerization study with diastereomeric dipeptides. Moreover, we report on the synthesis of a novel photoactive linker for solid phase peptide synthesis (SPPS). We have synthesized 5-carboxylic acid-7-nitroindoline for the attachment to Rink Amide resin. The attachment of the first amino acid to the solid support will be performed by Appel reaction, followed by regular SPPS. The cleavage of the desired peptide can now be performed photochemically to yield free peptide acids.

Funding Source: Beijing Normal University

Recommended Citation:
Liu , Chenxi ; Ornelas , Alfredo ; Michael , Katja . "Photochemical synthesis of peptide oxo-esters with minimal epimerization and development of photoactive solid support for peptide synthesis " (2013). COURI Symposium Abstracts, Summer 2013, ID= 213

Micro-sheets of HTiNbO5 for photocatalytic purposes

Natalie Lopez-Rodriguez[1^], Victor Correa[2], Maryam Zarei-Chaleshtori [2], Manuel Ramos[2*], Russell Chianelli[2]

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The chemical synthesis of Potasium-Titanium-Niobate ($KTiNbO_5$) micro-sheets is presented in this paper. The synthesis was performed using potassium carbonate (K_2CO_3), Niobium Oxide (Nb_2O_5) and Titanium di-Oxide (TiO_2) as starting products and carry-on using mechanical milling. Products were subjected to heat treatment at 1050 C for 20 hours without special airflow; the product was hydrogenated with HCl to produced $HTiNbO_5$. Results as obtained by powder XRD, SEM and STEM indicate a micro-sheets packing with average sheet size of 0.243 m and (001), (003), and (005) as principal crystallographic reflections. Catalytic performance was completed using photolysis method with Bromocresol Green and Methyl Orange, using a 21.73 M of dye solution was mixed with $KTiNbO_5$ catalyst and exposed to UV light at different time intervals. The catalytic test was repeated for different pH concentrations (2, 3.6, 7 and 9). Results indicate that after 40 minutes dye content was undetectable by UV-Vis spectroscopy for both dye molecules (Bromocresol Green and Methyl Orange) at all different pH concentrations indicating the photocatalytic activity on $HTiNbO_5$ material.

Funding Source: UMET-NSF

Recommended Citation:
Lopez-Rodriguez , Natalie ; Correa , Victor ; Zarei-Chaleshtori , Maryam ; Ramos , Manuel ; Chianelli , Russell . "Micro-sheets of HTiNbO5 for photocatalytic purposes" (2013). COURI Symposium Abstracts, Summer 2013, ID= 154

Synthesis and characterization of bimetallic metal-organic frameworks

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We are interested in studying metal-organic frameworks (MOFs) due to their high surface areas and their high capacity to capture gases of interest in energy-related technologies, such as H_2, CO_2, CH_4, etc. Recently, other applications for MOFs beyond gas sorption, such as catalysis and luminescence, have been the focus of recent attention.

We present here the syntheses of metal-organic frameworks using paddlewheel bimetallic centers, M_2, as building blocks (where M= Ru, Rh, and Mo). $M_3(BTC)_2$ and $M_8(BTEC)(BDC)_2$ isostructural frameworks were solvothermally synthesized using carboxylate organic linkers as starting materials. We used benzene-1,3,5-tricarboxylate (BTC) for the type $M_3(BTC)_2$ MOF. We have also synthesized a mixed-ligand MOF composed of benzene-1,2,4,5-tetracarboxylate (BTEC) and benzene-1,4-dicarboxylate (BDC) to produce MOFs with the chemical formula $M_8(BTEC)(BDC)_2$. These MOFs have been structurally characterized using IR and Raman spectroscopies, cyclic voltammetry, and EPR.

Recommended Citation:
Marcos , Mariana ; Veleta , Jose ; Villagrán , Dino . "Synthesis and characterization of bimetallic metal-organic frameworks" (2013). COURI Symposium Abstracts, Summer 2013, ID= 245

Chemical synthesis and morphology of silver micro-spheres

Chelsea M Marrero-Vidal[1^], Jonathan M Rodríguez-Cruz[1^], Diosetlyn Rojas-Ramos[2], Manuel Ramos[3*], Luis Hadame[4], Russell Chianelli [3*]

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The synthesis of silver micro-particles was done using two different water-based solutions. First solution was made using silver nitrate ($AgNO_3$) and sodium hydroxide to adjust its pH level up to 6.6. The second solution was done using a reducing agent of sodium citrate at room temperature. Both solutions were mixed under vigorously stirring conditions at 85^{o} C for 30 minutes. Product reaction turned to grayish-white color, indicating the formation of micro-spheres. The morphology of as-synthesized microspheres was observed using field emission gun Scanning Transmission Electron at 15 keV. Results from Energy Disperse X-Ray emission analysis indicates a pure silver content on microsphere surface with an average size distribution of 2 m were observed.

Funding Source: National Science Foundation, Universidad Metropolitana en Cupey-Puerto Rico

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Recommended Citation:
Marrero-Vidal , Chelsea ; Rodríguez-Cruz , Jonathan ; Rojas-Ramos , Diosetlyn ; Ramos , Manuel ; Hadame , Luis ; Chianelli , Russell .
"Chemical synthesis and morphology of silver micro-spheres " (2013). COURI Symposium Abstracts, Summer 2013, ID= 184

Nanomaterials via DNA-templated photopolymerization of Zn (II) bis-N-(4-pyridyl) benzamide acrylate

Melissa G Marrufo[1^], Shokooh Bahadorzadeh[1], Alejandro J Metta[1], Juan C Noveron[1*], Michael Chabinyc[2]

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DNA hybrid nanomaterials have attracted considerable attention due to the inherent intrinsic properties of oligonucleotides and the potential synergism that it could form with synthetic materials. Herein we demonstrate how double stranded DNA can be used to template the photopolymerization of designed DNA-binding complexes that contain acrylate groups. We prepared Zn (II) bis-N-(4-pyridyl) benzamide acrylate and characterized it with X-ray crystallography. The DNA-binding properties of the complex were studied under varying conditions and followed with NMR. UV-radiation photopolymerization reactions yielded DNA-templated products. The characterization with advanced microscopy techniques including AFM, TEM, and optical fluorescent microscopy, as well as X-ray photoelectron spectroscopy will be presented.

Funding Source: NSF

Recommended Citation:
Marrufo , Melissa ; Bahadorzadeh , Shokooh ; Metta , Alejandro ; Noveron , Juan ; Chabinyc , Michael . "Nanomaterials via DNA-templated photopolymerization of Zn (II) bis-N-(4-pyridyl) benzamide acrylate" (2013). COURI Symposium Abstracts, Summer 2013, ID= 194

Single-molecule metallo-micelles with fullerene-binding cores

Andrew J Mitchell^, Md T Islam, Brian Barraza, Juan Noveron*

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

Two essential steps in the wide adoption of organic solar cells are the increase of their photo-conversion efficiency and the lowering of their production costs. To achieve this, we need to increase our understanding of the mechanism of the photo-electric effect in solid-solutions containing polycyclic aromatic compounds that including fullerenes and other charge-carrying materials. Our research focuses on the synthesis of single-molecule metallo-micelles that comprise polycyclic aromatic compounds at their hydrophobic core. We seek to control their size and shape, as well as their ability to uptake fullerenes into their polyaromatic cores. The synthesis and characterization of polydiethylenetriaminezinc(II)-2-(pyrene-2carboxamido)succinate, as well as the metal-directed formation of metallo-micelles and fullerene physisorption will be presented.

Funding Source: National Science Foundation

Recommended Citation:
Mitchell , Andrew ; Islam , Md ; Barraza , Brian ; Noveron , Juan . "Single-molecule metallo-micelles with fullerene-binding cores" (2013).
COURI Symposium Abstracts, Summer 2013, ID= 150

Single molecule metallo-micelles: synthesis, self-assembly, and biological properties

James T Moore[1^], Andrew Chavez[2], Jose Marin[3], Sarit Pal[3], Juan C Noveron[3*]

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Single-molecule micelles are oligomers with surfactant properties that fold in water into nano-sized structures such as spheres and rods. They have a wide range of applications in industry and biomedical science as effective dispersants. One of their main features is their ability to remain folded into micelles in blood circulation, so they are expected to play major roles in drug-delivery, including the delivery of medicinal oligonucleotides such as siRNA. We synthesized a bipyridyl compound containing a long-alkyl chain in the middle of the molecule, namely N-acylated N,N-bis-4-pyridinylmethylalkylamide, in order to prepare coordination-directed polymers with surfactant properties that can generate single-molecule metallo-micelles in water. The compound was characterized using NMR, IR, and MS, and the corresponding polymer was characterized using NMR, DLS, and size-exclusion chromatography. The self-assembly of the product in water was studied with confocal optical microscopy, DLS, and Cryo-EM. The synthesis, characterization as well as biological properties will be presented.

Funding Source: National Science Foundation

Recommended Citation:
Moore , James ; Chavez , Andrew ; Marin , Jose ; Pal , Sarit ; Noveron , Juan . "Single molecule metallo-micelles: synthesis, self-assembly, and biological properties" (2013). COURI Symposium Abstracts, Summer 2013, ID= 247

Synthesis of dibenzo(b,f)(1,4)diazocine-6,11(5H,12H)-dione derivatives, Chameleon 1 compounds

Ziwei Pan[1^], Hiram Castillo-Marquez[2], Tomas Espinosa[3], Saideh S Mortazavi[3], James Salvador[3*]

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[2] Department of Chemistry, El Paso Community College.
[3] Department of Chemistry, The University of Texas at El Paso.

This study used aromatic diesters and diamines to synthesize dibenzo(b,f)(1,4)diazocine-6,11(5H,12H)-dione derivatives (referred to as Chameleon 1 Compounds), which are proposed to be dyes for color absorption displays.

Currently, most electronic displays (CRT, Plasma, LCD) consume much energy and are difficult to see in direct sunlight. Although E-Ink™ displays use less energy; they run more slowly, come only in black and white, and leave behind a ghost image. So a new type of technology is needed to create more energy efficient, faster, and color absorption displays.

This summer we synthesized the title compounds; which are bent non-aromatics, do not absorb visible light, and therefore are white. By adding two electrons, they become flat aromatic compounds that are more conjugated and therefore absorb visible light of different wavelengths.

The title compound was synthesized by the method of Paudler and Zeiler (*Journal of Organic Chemistry*, 1968, 2138). First diethyl phthalate was made by Fischer esterification. Then the ester was condensed with *o*-phenylenediamine to give a white solid after recrystallization. Other compounds were synthesized by similar condensations. The compounds were reacted with elemental lithium to make colored compounds, which demonstrates the proposed display technology.

Our next goal is to improve the yield of these syntheses. By this method we wish to develop an electronic screen economically and efficiently.

Funding Source: Beijing Normal University,NIH RISE Grant R25 GM060424

Recommended Citation:
Pan , Ziwei ; Castillo-Marquez , Hiram ; Espinosa , Tomas ; Mortazavi , Saideh ; Salvador , James . "Synthesis of dibenzo(b,f)(1,4)diazocine-6,11(5H,12H)-dione derivatives, Chameleon 1 compounds" (2013). COURI Symposium Abstracts, Summer 2013, ID= 104

Novel biomass conversion to solar cell products

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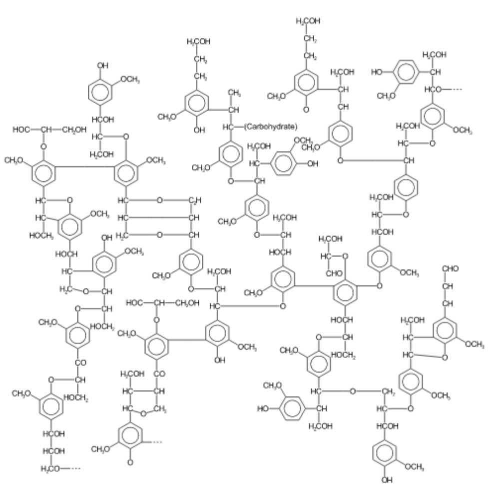
Harvesting the energy from the Sun to produce electricity using devices with renewable, low-cost components is an important step towards sustainability in the 21st Century. Existing solar cells comprise expensive components such as single-crystal silicon or ultra-fine synthetic chemical compounds. Despite their modest efficiencies, they involve high production costs that thwart their wide-spread application. Our goal is to develop a novel method to convert agriculturally-derived biomass into the key components of organic solar cells. Ideally, this would enable far-remote villages to make their own solar cells on-site using readily available agricultural products or even grass. To achieve this goal, we applied the Kraft process to New Mexico's Red Chile plants (sp Capsicum) and extracted high-molecular weight lignin bio-macromolecules with high efficiency. The Red Chile plant is a fast-growing plant that has an annual production of over 110,000 metric tons and propagates in arid climates. Using anaerobic, free-radical-induced methods, we converted lignin to polycyclic aromatic hydrocarbons (PAH) products, which are well-known to be excellent charge carriers in organic solar cells. We are currently investigating methods to make alkylated derivatives of the bio-derived PAHs in order to introduce self-organizing properties to render them as n-type components in organic solar cells. The biomass conversion process, characterization, and photovoltaic properties of the renewable PAH derivatives will be presented.



Funding Source: PREM

Synthesis and solar reaction of 1,4,5,8-anthracenetetrone with aldehyde

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

Cytotoxic activity of 5-acyl-1,4-naphthalenediol against leukemia and lymphoma cells has been discovered in our research group. We have been using 1,4-naphthoquinone as a starting material to synthesize 5-acyl-1,4-naphthalenediol in a photochemical reaction on the rooftop of the Chemistry and Computer Science building throughout the year. Photo-Friedel-Crafts acylation by sunlight is an ideal green chemistry reaction that benefits from the year-round sunny, unique climate of theTrans-Pecos region where the University of Texas at El Paso resides. The compound, 5-acyl-1,4-naphthalenediol, has been studied and tested by the Department of Biological Sciences at UTEP, and they displayed bioactivity against leukemia cells. We hypothesize that the electron transfer from hydrogen peroxide may cause one quinone moiety of 1,4-naphthalenediol to form hydroxyl radicals which are capable of cleaving leukemia DNA and killing those cells. To prove this hypothesis, 1,4,5,8-anthracenetetrone was selected to be synthesized because it may demonstrate more effective results against leukemia cells in comparison with the products of 1,4-naphthoquinone since it possesses two quinone moieties. The synthesis of 1,4,5,8-anthracenetetrone was approached by reported multi-step reactions that facilitated to establish high yields. Success of the synthesis and reaction of 1,4,5,8-anthracenetetrone with aldehydes may result in potential therapeutics against leukemia or other cancers.

Funding Source: UTEP, EPCC, LSAMP

Recommended Citation:
Pastrana , Ai ; Mito , Shizue . "Synthesis and solar reaction of 1,4,5,8-anthracenetetrone with aldehyde" (2013). COURI Symposium Abstracts, Summer 2013, ID= 215

Fullerenes bisadducts in organic photovoltaic solar cells

Yunhong Pi[1^], Maira R Ceron[2], Marta Izquierdo[2], Luis A Echegoyen[2*]

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[2] *Department of Chemistry, The University of Texas at El Paso.*

Organic photovoltaics (OPVs) have many potential uses in low-cost solar energy conversion devices. Solar cells that use fullerenes as acceptors are developing rapidly, 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. For these reasons we are designing new fullerene acceptors based on C_{60} and C_{70} bis-adducts.

One of the critical parameters in solar cells is the Open Circuit Voltage (V_{oc}), which is linearly correlated with the first reduction potential of the acceptor component (LUMO level). Fullerene bis-adducts have been found to increase the V_{oc} by 0.1–0.2 V, relative to the corresponding mono-adducts. The reason is the decrease of the electron-accepting ability due to the partial loss of -conjugation therefore, a raise in the LUMO level. In this work we report the preparation and testing of OPV devices based on the *cis*-2 bisadduct of C_{60} shown in the structure bellow.

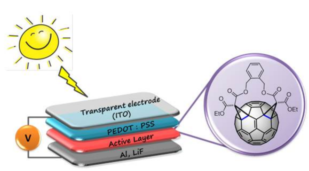


Diagram of the layers of an OPV device and structure of the tested cis-2 [60]fullerene bisadduct

Funding Source: COURI, The National Science Foundation, The Robert A. Welch Foundation

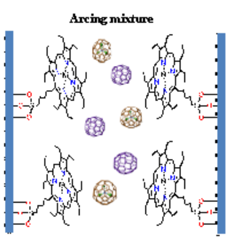
Recommended Citation:
Pi , Yunhong ; Ceron , Maira ; Izquierdo , Marta ; Echegoyen , Luis . "Fullerenes bisadducts in organic photovoltaic solar cells" (2013). COURI Symposium Abstracts, Summer 2013, ID= 109

Octaethyl-porphyrin functionalized silica gel for fullerene separation

Paulina A Quinonez^, Danisha Rivera-Nazario, Luis Echegoyen*, Guillermo Campos

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

Separation of empty fullerenes and endohedral metallofullerenes (EMFs) is based on their cage size and symmetry. Methods such as HPLC (High-Performance Liquid Chromatography) separation, stir and filter approach, and selective chemical oxidation (with “Magic Blue”) are not very efficient on a practical scale. The need for effective methods to isolate pure fullerenes is still present. Octaethyl-nickel-porphyrin (OE(Ni)IIP) is frequently used as a co-crystallization agent for fullerenes due to its unique and specific interactions with the different fullerene cages. This project involves the synthesis and immobilization of OE(M)P (M = 2H or Ni) on silica gel to be used as a stationary phase for separation of fullerene mixtures. Preliminary chromatographic results of immobilized OE(Ni)IIP on silica gel demonstrated an effective separation of EMFs from empty fullerenes derived from an arcing soot mixture (carbon materials). This method has proven to be less time consuming and purification can be scaled up compared to HPLC separations and other methods.



Functionalized Silica Gel Coulum

Funding Source: National Science Foundation

Recommended Citation:
Quinonez , Paulina ; Rivera-Nazario , Danisha ; Echegoyen , Luis ; Campos , Guillermo . "Octaethyl-porphyrin functionalized silica gel for fullerene separation " (2013). COURI Symposium Abstracts, Summer 2013, ID= 151

Study of multielectron redox chemistry through multiple bonded bimetallic species of the type M2-L-M

Nancy Rodríguez[1^], Dino Villagrán[2*]

[1] *Department of Chemistry, Monterrey Institute of Technology and Higher Education.*
[2] *Department of Chemistry, The University of Texas at El Paso.*

Multielectron redox chemistry is fundamental for the activation of small molecules, such as H_2O, N_2 and CO_2. Currently, these multielectron redox processes are not well understood and are the subject of active research throughout the world due to the evident energy and environmental implications of these small molecules. The goal of this project is the study of multielectron redox chemistry on compounds of the type M_2-L-M. We want to manipulate the reactivity of a M (M = Zn, Co, Ni, Rh, Ir) redox center by a quadruply bonded Mo_2 dimolybdenum core through a bridging linker (2,5-dihydroxy-1,4-benzoquinone). We use physical methods such as Nuclear Magnetic Resonance, Liquid Chromatography/Mass Spectrometry, Infrared Spectroscopy, X Ray Diffraction and Cyclic Voltammetry for the characterization of the compounds and for the study of the electron transfer reactions. We will demonstrate the syntheses of these compounds and preliminary redox reactivity.

Recommended Citation:
Rodríguez , Nancy ; Villagrán , Dino . "Study of multielectron redox chemistry through multiple bonded bimetallic species of the type M2-L-M" (2013). COURI Symposium Abstracts, Summer 2013, ID= 235

Silver micro-spheres as anti-bacterial agent

Diosetlyn Rojas-Ramos[1^], Jonathan M Rodríguez-Cruz[2], Manuel A Ramos[3*], Luis Hernandez-Hadame[4], Ricardo A Bernal[5*], Russell Chianelli[3*], Victor Correa[3]

[1] Materials Research and Technology Institute, Universidad Autónoma de Ciudad Juárez.
[2] Materials Research and Technology Institute, Universidad Metropolitana at Cupey, Puerto Rico.
[3] Materials Research and Technology Institute, The University of Texas at El Paso.
[4] Department of Physics, University of Texas at San Antonio, University of Texas at San Antonio .
[5] Department of Chemistry, The University of Texas at El Paso.

Silver has had many different applications throughout history; one of the most notable is bacterial growth inhibition. By controlling silver particle size and shape, the inhibitory effects can be controlled. Previous research employed many forms of silver particles, but to this date there is no literature on the usage of silver microspheres on bacteria. The synthesis of silver micro-particles was done using two different water-based solutions. First solution was made using silver nitrate ($AgNO_3$) and sodium hydroxide to adjust its pH level up to 6.6, the second solution was done using a reducing agent of sodium citrate at room temperature; both solutions were mixed under vigorously stirring conditions at 85^{o} C for 30 minutes. The morphology of microspheres was observed using field emission gun Scanning Transmission Electron indicates a symmetrical spherical shape formed from silver flakes. Testing for antibacterial was performed using a Gram (-) bacteria *E. Coli*, results indicate an inhibition ring of approximate of 0.9 cm indicating a good antibacterial agent.

Funding Source: National Science Foundation, Universidad Autónoma de Ciudad Juárez

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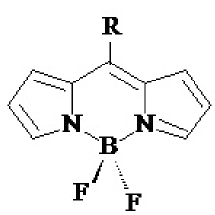
Synthesis and evaluation of new metal binding fluorophores

Laura Saucedo^, Robinson Roacho, Alejandro Metta, Keith H Pannell*

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

BODIPY molecules, 1, can be used as bio-tags, laser dyes and metal sensors due to their strong fluorescence properties. We wish to use the 8-thiomethyl-BODIPY, 1a, as a starting material and *via* reaction with the bidentate ligand cysteamine, $H_2NCH_2CH_2SH$, synthesize derivatives in which the BODIPY group is attached to either end to the 8^{th} position, 1b, 1c. In this manner either "free" end of the molecule can bind to metals of differing "hard-soft" characteristics; hard metals at the N atom, soft metals at the S atom.By this means the various fluorescent properties of the substituted-BODIPY will alter and permit detection of the differing metals.

Our initial reactions have shown the cysteamine reacts smoothly with 1a to form8-$NHCH_2CH_2SSMe$ (1d), an apparent insertion of the ligand into the C8-SMe bond, a very unique reaction. We have characterized1d using ^{13}C and ^{1}H NMR, UV/vis and emission spectroscopy and by single crystal X-ray diffraction. The new material emits in the blue region of the visible spectrum. Full spectroscopic and structural details will be presented along attempts to remove the S-S linkage to produce the BODIPY-$NHCH_2CH_2SH$ compound and the isomer with a free NH_2, BODIPY$SCH_2CH_2NH_2$. A mechanism for the formation of 1d will be proposed.



R = H (1); -SMe (1a); -$NHCH_2CH_2SH$ (1b); -$SCH_2CH_2NH_2$ (1c)

Funding Source: Office of the Provost

Recommended Citation:
Saucedo , Laura ; Roacho , Robinson ; Metta , Alejandro ; Pannell , Keith . "Synthesis and evaluation of new metal binding fluorophores" (2013). COURI Symposium Abstracts, Summer 2013, ID= 110

Synthesis of isoquinoline derivatives by solar reaction of imine derivatives and quinones

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Isoquinoline derivatives are biologically active; studies have shown isoquinoline derivatives play a role in neurotropic effect. The focus of this work is to synthesize isoquinoline derivatives via solar photochemical reaction and develop new methodology. The first step in the synthesis of isoquinoline derivatives was performed: The solution of benzoquinone or naphthoquinone and imine in benzene was exposed to sunlight under nitrogen atmosphere for one week. The ultraviolet wavelength utilized at the range of 380nm, for the use of Pyrex glassware. After completion of the reaction, isolation of product from the solution is problematic due to the hydrolysis. During the separation, the yield was diminished; however, ^{1}H NMR spectrum indicated the desired product has been formed. We plan to optimize our approach in order to increase yield by modifying reaction conditions including type and amount of solvent, reactant molar ratio and duration of exposure to radiation.

Funding Source: UTEP

Recommended Citation:
Saunders , Jong ; Guerra , Jorge ; Luu , Quang ; Mito , Shizue . "Synthesis of isoquinoline derivatives by solar reaction of imine derivatives and quinones" (2013). COURI Symposium Abstracts, Summer 2013, ID= 237

Self-organized single-molecule flowers: Towards controlling fullerene aggregation for solar cells

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Organic solar cells, which are also called Heterojuction Organic Photovoltaics, are the newest system devices capable of converting solar radiation to electrical power. One of their key components is the fullerene-derivative PCBM, which has the ability to generate functional aggregates in solid-solutions. In our project, we prepared single-molecule micelles that have a polycyclic-aromatic hydrocarbon core that is capable of binding fullerenes and forming controlled aggregates in different media. The single-molecule micelles were prepared from the photo-polymerization reactions of tetraethylene glycol diacrylate ester, and 1-anthracenol acrylate at different ratios and reaction conditions. We obtained copolymers brushes with pendant anthracene groups that in aqueous media fold into flower-like structures with aromatic cores. We investigated the uptake of C60 into the core of the single-molecule flowers and studied the ability to control their size, shape, and fullerene uptake. The ability to use these materials in solid-solutions of organic solar cells devices was investigated and will be presented.

Funding Source: NSF

Recommended Citation:
Sikorski , Ember ; Moore , James ; Noveron , Juan . "Self-organized single-molecule flowers: Towards controlling fullerene aggregation for solar cells" (2013). COURI Symposium Abstracts, Summer 2013, ID= 126

Electronic communication in covalently linked mixed-valent compounds

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Electron transfer (ET) reactions are fundamental for many biological mechanisms including photosystem II and the hydrogen pump in cellular respiration. Mixed-valent systems with bimetallic units have been used as platforms for the study of ET 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. We have synthesized precursors to 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 of dimers 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 of dimers. Electronic communication between the two bimetallic units, Mo_2, is observed when one of the bimetallic centers is oxidized and the other bimetallic 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 calculations. We have found that the electronic communication is strong with these organic linkers.

Recommended Citation:
Smith , Mark ; Villagrán , Dino . "Electronic communication in covalently linked mixed-valent compounds" (2013). COURI Symposium Abstracts, Summer 2013, ID= 255

Synthesis and characterization of new amide-BODIPY fluorophores

Peiyu Tu[1^], Robinson Roacho[2], Laura Sausaido[2], Keith H Pannell[2*]

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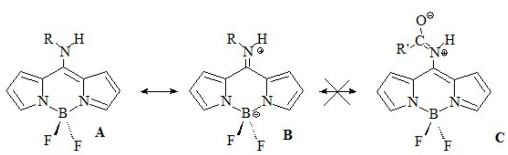
We recently reported the synthesis and emission characteristics of a series of 8-amino-BODIPY molecules. These materials are blue emitters and the source of this unusual fluorescence has been suggested to result from the capacity of the N lone pair to delocalize into the BODIPY core to produce a zwitter ion pair system, as noted for species A and B denoted below. To test this hypothesis, we have synthesized a series of amide BODIPYs containing an amide group in the 8-position. We surmise that since the amide group contains a significant C=N bond order, this will interfere with the ability of the N lone pair to interact with the BODIPY core, and remove the blue fluorescence. We treated 8-amino-BODIPY, A, B, R = H, with NaH to form the $[HN\text{-}BODIPY]^{-}Na^{+}$ salt that we reacted this with three acetyl-chlorides to form three 8-amide-BODIPYs, C, R = CH_3, $ClCH_2$ and Ph. These new molecules have been characterized by NMR, UV/visible, and emission spectroscopy, and by single crystal X-ray diffraction. As predicted, the blue emission is dramatically changed due to significant amide C=N bonding.



Funding Source: Beijing Normal University

Redox potential tuning by mixed-ligand quadruply bonded dimolybdenum compounds

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Guanidinate bridging ligands have been found to be able to support compounds that are more easily ionized than the cesium atom. We have synthesized bimetallic compounds with different ratios of ligands of different basicity, such as guanidinates and formanidinates and measure the effect of the different rations to the reduction potentials. We have synthesized different combinations of $Mo_2(DAniF)_x(hpp)_{4-x}$, (where DAniF is the anion of N,N'-di-p-anisylformamidine and hpp is the anion of hexahydro-2H-pyrimido[1,2-a]pyrimidine), $Mo_2(hpp)_x(Oac)_{4-x}$, and $Mo_2(OAc)x(DAniF)_{4-x}$ to measure their redox potentials. We have characterized these compounds by structural, electrochemical and spectroscopy methods. We have observed that the redox potentials shift to negative potentials with the addition of more guanidine ligands. The difference in redox potentials between $Mo_2(DAniF)_4$ (the fully formamidinate substituted compound) and $Mo_2(DAniF)_3(hpp)$ (the first in the series of $Mo_2(DAniF)_x(hpp)_{4-x}$) is in the order of half a volt in the negative direction.

Funding Source: The University of Texas at El Paso

Recommended Citation:
Valdez , Nathalie ; Villagran , Dino . "Redox potential tuning by mixed-ligand quadruply bonded dimolybdenum compounds" (2013). COURI Symposium Abstracts, Summer 2013, ID= 270

Synthesis of an endohedral metallofullerene epoxide: The missing O-bridged analog of methanofullerenes

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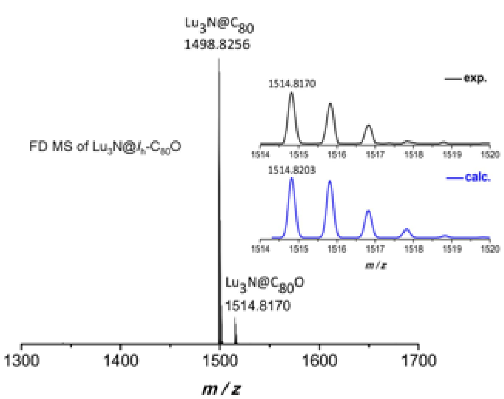
Exohedrally functionalized EMFs have many potential applications in nanoscience and biochemistry. To promote the applications, exploring new methods to synthesize new derivatives is extremely important. Some established synthetic methods such as [2+1] cycloaddition, [2+2] cycloaddition, 1,3-dipolar cycloaddition, Diels Alder, free radical addition, photochemical reactions and electrosynthesis have been extensively used to functionalize EMFs. Many EMF derivatives such as methanofullerenes, N- and Si-bridged analogs of methanofullerenes have been reported. However, O-bridged analogs of methanofullerene have not been studied yet. Here, we report an effective synthetic method to prepare $Lu_3N@I_h\text{-}C_{80}$ epoxide under mild conditions. The product was separated by HPLC and characterized by mass spectrometry and UV-vis-NIR spectroscopy, which indicate that the compound corresponds to a [6,6]-open cage monoepoxide. The electrochemical properties were studied by cyclic voltammetry.



Recommended Citation:
Valdez Moreira , Juan ; Li , FangFang ; Echegoyen , Luis . "Synthesis of an endohedral metallofullerene epoxide: The missing O-bridged analog of methanofullerenes" (2013). COURI Symposium Abstracts, Summer 2013, ID= 117

Bimetallic systems as platforms for supramolecular chemistry and metal-organic frameworks

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Homonuclear bimetallic units (M_2= Mo_2, W_2, Ru_2, Rh_2) with carboxylate ligands have been utilized to produce supramolecular arrangements, such as metal-organic frameworks (MOFs) and two-dimensional coordination bimetallic dimers. We have focused our interests in the study these compounds to elucidate their physicochemical properties beyond gas sorption. The synthetic approach for these supramolecular compounds will be discussed. We have characterized our bimetallic complexes by X-ray diffraction, IR, UV-Vis, cyclic voltammetry, and electron paramagnetic resonance. We will present results that show our insight in their physical and chemical properties such as electronic communication, and magnetic activity and some preliminary reactivity results.

Funding Source: College of Science

Recommended Citation:
Veleta , Jose ; Marcos , Mariana ; Villagran , Dino . "Bimetallic systems as platforms for supramolecular chemistry and metal-organic frameworks " (2013). COURI Symposium Abstracts, Summer 2013, ID= 248

Organic donor-acceptor dendrimers as potential photovoltaic materials: Synthesis, structural categorization, and photophysical study

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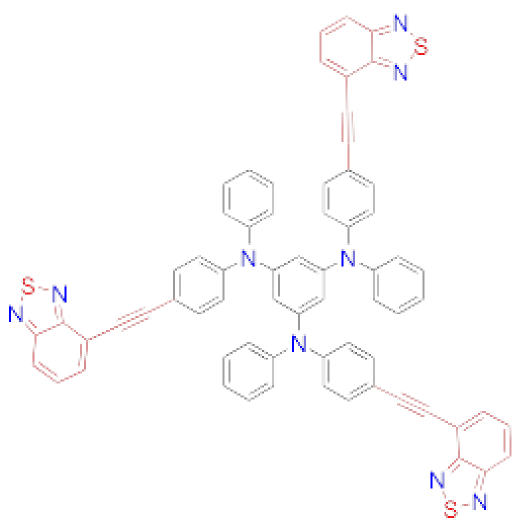
The synthesis and structural characterization of a discotic 1,3,5-triaminobenzene derivative containing 2,1,3-benzothiadiazole derivatives at the periphery is presented, Figure 1. The triaminobenzene core is designed to serve as the electron-donating component, and the benzothiadiazole derivatives as the electron-acceptors. The architecture of this type of donor-acceptor molecule is designed to maximize electron transfer by maximizing the number of donors and acceptors within the molecule. The long-term goal of these types of molecules is the preparation of p-stacked assemblies, as reported for similar discotic molecules, and the determination of their power conversion efficiencies.

Figure 1. Architecture of the donor-acceptor molecule.



Funding Source: NSF

Recommended Citation:
Villafria , Niccolo ; Nuñez , Jose ; Dai , Zhi . "Organic donor-acceptor dendrimers as potential photovoltaic materials: Synthesis, structural categorization, and photophysical study" (2013). COURI Symposium Abstracts, Summer 2013, ID= 263

Synthesis and characterization of electrically responsive molecules based on aluminum(III) complexes

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An organic light emitting diode (OLED) is a device that possesses an electroluminescent layer constituted by an organic compound that responds to an electrical current by emitting light. Generally, OLED's are used in digital displays such as TV screens, computer monitors, cellphones, etc. Tris(8-hydroxyquinolate) aluminum(III) has been widely investigated for the fabrication of OLED's because of its unique emissive properties and electron transfer abilities. In this work we explore the potential use of a new series of Alq3 derivatives that might enhance the electron transfer properties and increase the performance of the OLED's. The synthesis of the ligand was accomplished via solar driven acylation (Photo Friedel-Craft Acylation) using quinoline-5,8-dione and quinoxalin-5,8-dione as mainframes. Five different aldehydes were used during this research; each one featured particular results. The main results are centralized in ligands that had acetaldehyde as a constituent in order to simplify characterization. Once quinoline-5,8-dione was acylated. Given that it had two possible chelating positions that hindered the characterization of the complex, the molecule was protected in order to avoid such situation, but nevertheless, the yields were lower than expected for reasons that are under investigation. Quinoxalin-5,8-dione was proposed in order to ease the process of characterization. Overall the Al complex reaction showed good yields. The compounds were characterized by ^{1}H-NMR (Nuclear Magnetic Resonance), UV-Vis and mass spectrometry; all exhibited characteristic data of Alq3 complexes. For future work we intend to build a profile on the different compounds obtained during this research based on their emission performance and endurance.

Funding Source: Welch Foundation

Recommended Citation:
Villaseñor , Jose ; Jacinto , Brian ; Mito , Shizue . "Synthesis and characterization of electrically responsive molecules based on aluminum(III) complexes" (2013). COURI Symposium Abstracts, Summer 2013, ID= 144

Structural studies of a core mammalian circadian clock protein ARNTL: Aryl hydrocarbon Receptor Nuclear Translocator-Like

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Human body has an intrinsic biological clock called circadian rhythm that synchronizes our sleep-wake cycle with the day and night. Physiological processes such as hormone secretion and body temperature are strongly regulated by this circadian clock, which enables organisms to use energy efficiently and adapt to environment readily. The protein under investigation, Aryl hydrocarbon receptor nuclear translocator-like (ARNTL), is one of the core regulatory components in a transcriptional/translational feedback loop that is responsible for maintain the circadian rhythm at a molecular level. In this feedback loop, ARNTL works with the Circadian Locomotor Output Cycles Kaput (CLOCK) protein forming a heterodimer that binds DNA to initiate the expression of other circadian proteins that will negatively regulate on CLOCK/ARNTL complex to reset the clock. In this research, biochemical and biophysical techniques will be used to investigate ARNTL. The ultimate goal is to determine its atomic structure with or without CLOCK. The structural determination is crucial to understand the detailed mechanisms that regulate the circadian rhythm. The gene of ARNTL will be cloned into an expression vector and transformed into bacterial cells for protein production, in which different experiments such as restriction enzyme digestion, ligation to vector and plasmid transformation will be performed. Protein expression will then be carried out, which is necessary for the subsequent protein purification using affinity and other chromatography techniques. After obtaining a highly homogenous protein sample, crystallization trials will be conducted, followed by structure determination of ARNTL utilizing X-ray crystallography.

Recommended Citation:
Xiao , Lu ; Avila , Gustavo ; Xiao , Chuan (River) . "Structural studies of a core mammalian circadian clock protein ARNTL: Aryl hydrocarbon Receptor Nuclear Translocator-Like" (2013). COURI Symposium Abstracts, Summer 2013, ID= 111

Synthesis of two new nitrogen heterocyclic compounds: pyridazine and quinazoline derivatives

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Pyridazine and quinazoline derivatives have received rising attention due to their extensive biological activity and structural diversity. They both play important roles in nitrogen heterocyclic compounds. The pyridazine derivatives are widely used in fungicides, insecticides, plant growth regulators and medicines that cure neurological disorders and cancer. The quinazoline derivatives are often used as pesticides and antitumor, antihypertensive and antimicrobial medicines. In this study, several simple procedures are used to synthesize pyridazine and quinazoline derivatives. It is reported that the radical of 1,4-naphthohydroquinone is generated photochemically by sunlight, and it allows acylation with various aldehydes. Then, oxidation of the obtained acylated 1,4-naphthohydroquinones were successfully carried out to afford acylated 1,4-napthoquinone in good yield. Another solar reaction was assembled so as to add an additional acyl substituent. Finally, hydrazine or urea will be used in order to produce the pyridazine and quinazoline derivatives. The structures of these synthesized compounds are characterized by ^{1}H NMR spectroscopy. 2-Benzoyl-1,4-naphthoquinone has been obtained, and the second acylation reaction is ongoing. After the pyridazine and quinazoline derivatives are obtained, their effects as pesticide and medicine will be tested. In addition, we expect that there will be diverse applications of these two new nitrogen heterocyclic compounds.

Funding Source: Beijing Normal University

Computer Science, Engineering, Physics and Mathematics

A testbed for evaluating the robustness of game-playing agents

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Game theory is an important tool for decision making and strategic reasoning in many fields including computer science. There are a large number of concepts for analyzing multi-agent decision problems provided by this theory. However, there are challenges to selecting a strategy that maximizes the payoffs of an agent, while also achieving robustness in the sense that the strategy will not perform poorly if another agent chooses an unexpected action. This case study aims to evaluate the robustness of game-playing agents with different strategies using a testbed that simulates a round-robin tournament between them. This tournament consists of generating a large number of random normal form games. Each agent will be tested against the other agent strategies in these random games. The idea is to identify the effectiveness and robustness of different agents using the average payoff, the worst-case payoff and other data points as evaluation criteria. This research also focuses on developing new agent strategies and game abstractions with the goal of identifying robust strategies that perform well against all agents even those not using Nash Equilibrium or behaving irrationally. This testbed has practical relevance for education in game theory and will eventually allow other students to create their own game-playing agents and even identify strategies that can be used in real world problems. This research will advance the state-of-the-art in game theory and strategic reasoning implementing robust game-playing agents and evaluating different methods of game abstraction while also helping to educate others about game theory and decision making.

Funding Source: NSF Grant IIS-1241434

Recommended Citation:
Aleman Pagan , Miguel ; Kiekintveld , Christopher . "A testbed for evaluating the robustness of game-playing agents" (2013). COURI Symposium Abstracts, Summer 2013, ID= 288

Comparing and extending approaches that access scientific databases through semantic web ontologies

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The increasing amount of scientific data produced and managed using heterogeneous formats and schemas has created the need to automate the access, search, and retrieval of this data. Semantic Web technologies provide a promising solution for this challenge through the creation of ontologies that further describe scientific data. The goal of this research is to evaluate current approaches that integrate legacy scientific databases with ontologies. One of the challenges when creating ontologies from legacy databases is that the data is typically migrated into a triple store or an ontology management system, which creates an additional data source to maintain and update. We are investigating approaches that allow us to access these databases with ontologies without migrating them into other systems. We are currrently comparing the scalability and expressivity of D2RQ (http://d2rq.org/) and DBOwlizer (http://semanticscience.org/projects/dbowlizer/), using the RDB to RDF Mapping Language (R2RML). To compare these approaches we are using sensor-generated data for ecological research generated by the Systems Ecology Lab located at the University of Texas at El Paso. This project requires the storage and integration of large amounts of heterogeneous data that will be integrated via ontologies as part of our future work. We anticipate that efforts that bridge legacy databases and ontologies will facilitate the adoption of semantic web technologies for the handling and processing of large amounts of scientific data.

Funding Source: NSF Grant IIS-1241434

Recommended Citation:
Cardoza , Joshue ; Villanueva-Rosales , Natalia . "Comparing and extending approaches that access scientific databases through semantic web ontologies" (2013). COURI Symposium Abstracts, Summer 2013, ID= 287

Sealing FDM fabricated parts

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In Fused Deposition modeling, a 3D printing or Additive Manufacturing technology that extrudes thermoplastic materials, the processing parameters play a critical role in the final performance of the fabricated parts. Among these parameters, raster-to-raster and contour-to-raster distances can be specified, which may result in an interconnected network of air channels affecting the permeability of the fabricated part. To prevent an FDM-built part from being porous and permeable, raster widths were modified in this study to remove voids within layers throughout the entire part. The raster widths were prescribed by a program that was written using LabVIEW and MATLAB. The reduction in size or removal of voids was confirmed by visually inspecting the layers using a stereomicroscope. A pressure vessel, shaped like a dome, was printed with modified raster widths and tested for leaks by submerging the part in water. The part was subjected to internal air pressure, which topped at 30 psi, the same as domestic water pressure, to prove that FDM-built parts may be used in water and gas applications. Once pressure inside the dome was increased to the desired pressure, the elapsed time was recorded until part failure, indicated by air bubbles escaping the high pressure region, traveling through the FDM-built part, and visibly moving through the water. Results show that FDM-built parts can be sealed by modifying the build parameters.

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

Recommended Citation:
Cuaron , Alejandro ; Hossain , Mohammad ; Espalin , David ; Medina , Francisco ; Wicker , Ryan . "Sealing FDM fabricated parts" (2013).
COURI Symposium Abstracts, Summer 2013, ID= 249

Effective algorithms for computing covariance and correlation based on privacy-protected data

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In medicine (and in many other situations), it is necessary to process data while preserving the patients' confidentiality. One of the most efficient methods of preserving privacy is to replace the exact values with intervals that contain these values. For example, instead of an exact age, a database only contains the information that the age is, e.g., between 10 and 20, or between 20 and 30, etc.

We are interested in computing correlations (and other statistical characteristics) based on this data. For privacy-protected data, different values from the intervals lead, in general, to different estimates for the desired statistical characteristic. Our objective is then to compute the range of possible values of these estimates.

Algorithms for effectively computing such ranges have been developed for situations when intervals come from the original surveys, e.g., when a person fills in whether his or her age is between 10 or 20, between 20 and 30, etc. These intervals, however, do not always lead to an optimal privacy protection; it turns out that more complex, computer-generated "intervalization" can lead to better privacy under the same accuracy - or, alternatively, to more accurate estimates of statistical characteristics under the same privacy constraints. It is therefore necessary to extend the existing efficient algorithms for computing covariance and correlation based on privacy-protected data to this more general case of interval data.

In this work, we describe generalized algorithms, and we provide estimates for their computation time which show that these algorithms are indeed computationally feasible and efficient.

Funding Source: DHS, NCBSI Center

Recommended Citation:
Day , Joshua ; Jalal-Kamali , Ali ; Kreinovich , Vladik . "Effective algorithms for computing covariance and correlation based on privacy-protected data" (2013). COURI Symposium Abstracts, Summer 2013, ID= 231

Development of 'Lick and Stick' wireless temperature sensors

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The development of wireless, high temperature sensors has received increasing attention due to the current need of precise temperature monitoring in energy conversion systems such as coal-based power plants and gas turbines. Accurate temperature control in these systems aims at achieving higher combustion efficiency and lower degree of emission. Unfortunately, the adverse conditions present in systems aforementioned limit current solutions given the presence of welded joints, energy storage devices and semiconductor materials in their configuration. To alleviate these issues, this paper presents the design, simulation, and manufacturing process of a low cost wireless temperature sensor. The temperature sensor was designed following the principle of metamaterials by utilizing Split Ring Resonators (SRR) and a dielectric substrate. The proposed wireless, passive temperature sensor behaves like an LC circuit where the metal ring provides the inductance and the ceramic acts as a capacitor. The sensor was fabricated utilizing Silicon Bronze washers as the SRRs and Barium Titanate ($BaTiO_3$) as the dielectric substrate. The software package ANSYS HFSS was used to perform several simulations in order to define the structure and determine the optimal dimensions for the temperature sensor. The fabrication was performed by compressing the dielectric substrate/washers configuration at 3 metric tons to obtain the geometry needed. After the compression, the resulting substrate was sintered to achieve better hardness and full density. Testing will be performed in order to compare with the simulation results and record the capabilities of the fabricated sensor, fulfilling the scope of the project.

Funding Source: Department of Energy, Provost Office

Recommended Citation:
Delfin , Diego ; Karim , Hasanul ; Gaytan , Sara ; Rumpf , Raymond ; Lin , Yirong . "Development of 'Lick and Stick' wireless temperature sensors" (2013). COURI Symposium Abstracts, Summer 2013, ID= 277

Molecular dynamics study of phthalocyanine and sulfonated-phthalocyanine and C60 interface

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Organic photovolatics (OPV) hold promise as cheap large-area technology for power generation. The fundamental mechanism of power conversion in OPV is dominated by interfacial processes such as charge transfer and charge separation. The energetics and dynamics of these processes depend on the morphology of the donor and acceptor (DA) interfaces. In experiments, these DA complexes are usually deposited on metal surfaces using spin coating or similar technique. To understand the morphology of interface and growth of the OPV on surface, we use molecular dynamics simulations with various layers of phthalocyanine and sulfonated phthalocyanine molecules on a Ag(111) surface. We examine the effect of sulfonation on the morphology of thin films. By introducing the acceptor molecules such as C60 in various concentrations we examine the variation in the morphology of OPV films with the different forms of phthalocyanine surfaces. We then select a few configurations of the DA complexes from the molecular dynamics trajectories and determine the charge transfer energies and the transport gap at the quantum mechanical level. Finally, by averaging over the configuration we obtain insights into the charge transfer energetics and the energy level alignments at the organic DA interface.

Recommended Citation:
Diaz , Carlos ; Olguin , Marco ; Baruah , Tunna ; Zope , Rajendra . "Molecular dynamics study of phthalocyanine and sulfonated-phthalocyanine and C60 interface" (2013). COURI Symposium Abstracts, Summer 2013, ID= 240

Investigating the electronic structure of dye attached fullerenes for applications in photovoltaics

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C_{60} fullerene and its derivatives are the most popular acceptors in molecular/polymeric complexes used in organic photovoltaics. Recently, Chabynic et al. have synthesized a few functionalized C_{60} molecules with dye molecules for use as acceptors in solar cells. The functional units are diketopyrrolo-pyrrole and TBTDT pigments. Using density functional theory and large polarized all electron Gaussian basis , we optimized the structures of the C60-DPP and C60-TBTDT molecules. The inspections of molecular orbitals of these systems indicate that the HOMO level is localized on the dye whereas the LUMO 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. The electronic structure of the ground and the excited states will be presented.

Funding Source: NSF

Recommended Citation:
Garnica , Amanda ; Baruah , Tunna ; Zope , Rajendra . "Investigating the electronic structure of dye attached fullerenes for applications in photovoltaics" (2013). COURI Symposium Abstracts, Summer 2013, ID= 122

Interatomic potential for aluminum for high pressure atomistic simulation: The Embedded Atom Method

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The interatomic potentials for Al developed so far have not been proven reliable under high pressure compression. The aim of our project is to develop a new semi-empirical interatomic potential of Al by using the embedded-atom method (EAM) and to carry out an atomistic simulation under extreme high pressure conditions. The occurrence of phase transition during such high pressure compression contributes to very important phenomena in metals such as plastic deformation and fracture and is related to unstable stacking fault energy of the system. In the case of Al, the phase transition of the most stable fcc phase to hcp determines the occurrence of such a deformation. To develop a potential which would remain stable under high pressure compression without any change in phase, a database containing experimental data and density functional theory data is prepared which includes second order elastic moduli, bulk modulus, cohesive energy, surface energy, stacking fault energy, unrelaxed vacancy formation energy, vacancy migration energy, Gruneisen parameter and phonon dispersion relation at P=0 GPa. A cold curve at T=0 K for a face centered cubic, hexagonal closed packed structure and body centred cubic structures for Al crystal was generated using the data obtained from Vienna Ab initio Simulation Package and fitted to the Rydberg function. The energy minima of Cold Curve for each structure were shifted so as to obtain the empirical value of energy of cohesion equal at the equilibrium ground state structure. The slope of this Equation of State curve gives the pressure for the isotherm.

Recommended Citation:
Ghimire , Punam ; Ravelo , Ramon . "Interatomic potential for aluminum for high pressure atomistic simulation: The Embedded Atom Method" (2013). COURI Symposium Abstracts, Summer 2013, ID= 272

Image fusion

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The purpose of our research is to determine the best method of fusing a high resolution gray-scale satellite image with a lower resolution multispectral satellite image to produce a multispectral image of high spatial resolution. Satellites provide panchromatic and multispectral images with different characteristics which can be fused. Using these fused images, geographers, for instance, will be able to use the resulting color image to study surface vegetation. Our research includes testing color transfer methods as well as discrete wavelet transformation (DWT) methods using Haar and Daubechies filters. We take three different satellite images and test each method on them. To determine the quality of the resulting fused image, we investigate four different measurements. The peak signal-to-noise ratio and entropy are calculated to determine the improvement of spatial resolution, and the coefficient correlation and spectral discrepancy are calculated to compare preservation of spectral characteristics. The color transfer methods show fair spatial improvement and poor color preservation; the DWT methods on the other hand yield better preservation of color. Among the methods tested the one which replaced the luminance channel of the enlarged multispectral image with the gray-scale image proved to provide the best results. Our findings will serve as a basis for future research investigating further variations of the tested color transfer methods to additionally improve the quality of the fused image.

Funding Source: Mathematical Association of America, National Security Agency, National Science Foundation

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Recommended Citation:
Gonzalez , Brenda ; Puente , Jasmine ; Knaust , Helmut . "Image fusion" (2013). COURI Symposium Abstracts, Summer 2013, ID= 234

Iris image compression utilizing the FBI compression algorithm

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Iris imaging for biometric identification is starting to gain recognition across different fields. Therefore, a need for efficient iris image compression algorithms with optimal resolution will ensue. The basis for our research is the Federal Bureau of Investigation's use of the Wavelet Scalar Quantization (WSQ) algorithm for fingerprint images. We adjust this algorithm, derived from the JPEG-2000 standard, to work well with iris images. Our algorithm entails a discrete wavelet transform, a quantization scheme for further image compression, and an inverse method for image retrieval. We experiment with various wavelet transforms such as Haar, Daubechies-6, and Cohen-Daubechies-Feauveau 9/7 filters, in order to gauge the compression proficiency of the wavelet and quantization process. To quantify the quality of our results, we evaluate the Peak Signal-to-Noise Ratio (PSNR) measure for the different wavelet transforms. Our modified FBI algorithm yields effective results when applied to iris images. Our procedure generates iris images that retain a considerable amount of detail of the iris pattern and texture and at the same time exhibit excellent compression results.

Funding Source: Mathematical Association of America

Recommended Citation:
Gonzalez-Guevara , Ariel ; Ortega , Aaron ; Martinez , Melissa ; Knaust , Helmut . "Iris image compression utilizing the FBI compression algorithm" (2013). COURI Symposium Abstracts, Summer 2013, ID= 228

Heat transfer characteristics of liquid methane

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Research suggests liquid methane could function as a possible fuel for regeneratively cooled rocket engines in future space exploration with advantages including a reduction in initial payload and associated launch costs. The research conducted at the Space Exploration Technology and Research (cSETR) laboratory provides useful data to the limited amount of empirical data available about liquid methane's heat transfer characteristics. This study focused on the behavior of several test sections representing regeneratively cooled rocket engine cooling channels. Each specimen had varying cross-sectional geometries, and an analysis was made based on their cooling effects as liquid methane was flowed through each channel. These experiments were performed at vacuum conditions to simulate space conditions, which eliminate convective losses and minimizes material oxidation. Additionally, varying block temperatures are used to provide different constant heat fluxes, and varying pressures are used to observe the effects of cooling at different Reynolds numbers. Our results conclude that the highest heat transfer coefficient has been obtained with the rectangular channel, followed by the square, then the circular channel. These results demonstrate that the larger the aspect ratios have better cooling effects. Finally, the results attained can be applied to help determine the cooling channel design criteria for future space missions.

Funding Source: NSF, NASA

Recommended Citation:
Haisan , Lisa ; Trejo , Adrian ; Galvan , Manuel ; Choudhuri , Ahsan ; Robinson , Nate . "Heat transfer characteristics of liquid methane" (2013). COURI Symposium Abstracts, Summer 2013, ID= 211

Student busing system

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The University of Texas at El Paso is in need of innovative technologies and methods in an effort to become more environmentally friendly. Currently, the air quality in the El Paso area is substandard and the main reason for this is exhaust gas released by motor vehicles.

The primary objective will be to develop an efficient busing system for the UTEP community. This system will meet all of the requirements needed in order to be successful in the short and long term lifespan.

A dedicated bus system has a high likelihood of proving benefits in the reduction of emissions gases from student vehicles, may prove to be more cost effective to students than car ownership, and would result in furthering the exposure of UTEP throughout the El Paso area as an institution growing toward Tier 1 status.

The Systems Engineering methodology will be used in the development of this project. Systems engineering methodologies have successfully been proven in numerous organizations and applications as they allow for a structured approach to requirements gathering and analysis, architecture development, trade- off studies, verification, validation, and implementation

The benefits provided to students by such system include a great reduction of commuting costs for students, as well as an overall positive impact on the greater El Paso area air quality due to the resultant reduction of Carbon Dioxide expulsion by students' vehicles during their commute to UTEP.

Funding Source: NSF

Recommended Citation:
Hernandez , Luis ; Salomon , Mario ; Smith , Eric . "Student busing system" (2013). COURI Symposium Abstracts, Summer 2013, ID= 251

Improving mechanical properties of FDM built parts

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Fused Deposition Modeling (FDM) is an Additive Manufacturing (AM) or 3D Printing technology that creates geometric figures by dispensing molten ABS plastic from a nozzle in a layer-by-layer fashion. Due to the layering, there are some faults in the mechanical properties of the produced parts compared to those of the Injection Molded ABS P400, but the time consumed by the FDM to make a piece is significantly less. Therefore, by improving the mechanical properties of the FDM process, time and the efficiency of the part will no longer be an issue. It is hypothesized that by embedding wire mesh with a Techno CNC (Computer Numerical Control) Router and a Dukane Ultrasonic Welder, into tensile specimens created by the FDM, will show a significant increase in the elastic modulus and the strength of the test piece. Two methods will be put to use when embedding; one being by applying pressure into a tensile specimen section-by-section, and the other by creating a program that will apply pressure in one continuous move. Different mesh material that had diverse modulus of elasticity, and diameter were used as well as an Instron System to test the amount of strain and stress the specimen can withstand. Results of the study show that mechanical properties are improved.

Funding Source: W.M Keck Center for 3D Innovations, NSF

Recommended Citation:
Herrera , Lluvia ; Kim , Chi Yen ; Wicker , Ryan ; Espalin , David ; Cuaron , Alejandro ; Hossain , Mohammad . "Improving mechanical properties of FDM built parts" (2013). COURI Symposium Abstracts, Summer 2013, ID= 180

Stopping the world: Identifying important characteristics for garbage collection

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This research examines a technical challenge related to automatic memory management for power-limited delay-intolerant systems such as smartphones and tablets. Automatic memory management is a key feature of Google's Android operating system and requires a periodic energy- and time-intensive computation named "garbage collection" (GC) responsible for identifying memory eligible for recycling. Proactive scheduling of GC is important because its efficiency increases if scheduled later, but interactive systems will suffer noticeable delays if it is scheduled too late, memory resources will be temporarily exhausted, and apps must be paused until GC completes. Optimal scheduling of GC is difficult because it requires foreknowledge of program behavior.

This research seeks to construct a classifier that reliably predicts the time that GC should be scheduled from attributes of system state. This is being done through analysis of a system that performs no proactive GC by examining of state attributes prior to memory exhaustion events. Machine learning techniques are being used to perform this analysis and automatically tune potential classifiers.

Results will be shown at the symposium.

Funding Source: NSF

Recommended Citation:
Hudgins , Edward ; Fuentes , Olac ; Freudenthal , Eric . "Stopping the world: Identifying important characteristics for garbage collection " (2013). COURI Symposium Abstracts, Summer 2013, ID= 252

Investigation of metal oxide nanowires modified carbon materials for energy storage devices

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Energy storage devices, such as Lithium ion batteries (LIB) and super-capacitors, have drawn extensive attention due to their wide range of applications in electric vehicles, portable electronics, and aerospace. To date, the main obstacle is to improve energy density and charge/discharge rate for these devices. Herein, we demonstrate a novel approach of growing aligned nanowires by low temperature hydrothermal method on graphene and carbon fibers for electrode materials of LIB and super-capacitors, respectively. These hybrid materials combine the high specific surface area of carbon based materials and pseudo-capacitive effect of metal oxide nanowires. The aligned nanowires could lead to fast ion diffusion rates. Scanning Electron Microscopy (SEM) and X-Ray Diffraction (XRD) are used for initial characterization of the hybrid material system. Battery Analyzer and Potentio-Galvanostat are used for electrochemical measurements. It is expected that the developed nanowire hybrid structures could have the potential to enhance the specific capacity and charge-discharge rate.

Recommended Citation:
Liu , Hongguang ; Mohammad , Shuvo ; Lin , Yirong . "Investigation of metal oxide nanowires modified carbon materials for energy storage devices" (2013). COURI Symposium Abstracts, Summer 2013, ID= 258

Combustion synthesis of nanostructured magnesium silicide

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The present paper investigates combustion synthesis of nanostructured magnesium silicide (Mg2Si), a promising thermoelectric (TE) material which could be used in a temperature range from 250 600 C, i.e., in the operation domain of TE generators used in industrial applications. Magnesium and silicon are non-toxic, abundant, and relatively inexpensive. To fabricate nanostructured Mg_2Si, we use combustion synthesis, also called self-propagating high-temperature synthesis (SHS), recognized as a low-energy-consuming and clean method for synthesis of advanced materials. We have prepared the mixtures of Mg and Si powders, compacted them into cylindrical samples, and ignited in argon environment. As a result, we obtained magnesium silicide, which was, however, porous and weak. To fabricate denser and stronger products, we have employed the so-called SHS compaction technique which allows for the material to be hot-pressed immediately after combustion. To obtain a desired nano-structure of the products, we are using high-energy ball milling. The milled materials are characterized using a multi-laser particle size analyzer and a specific surface area analyzer, while the obtained products are analyzed using X-ray powder diffraction and scanning electron microscopy.

Funding Source: Provost Office Summer Research Assistant Program

Recommended Citation:
Lopez , Israel ; Shafirovich , Evgeny . "Combustion synthesis of nanostructured magnesium silicide" (2013). COURI Symposium Abstracts, Summer 2013, ID= 290

An experimental investigation of a packet prioritization method for voice communication

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As telecommunications systems migrate to packet-switched networks (LTE, VoIP), systemic errors such as packet loss that hinder overall quality have become increasingly salient. This study examines a way in which this phenomenon of packet loss due to network congestion or latency can be mitigated by high-level protocols. Our focus is a theoretical codec that can selectively prioritize certain packets based on the importance of the dialog activity at that moment, for example a location or a number. The utility of such a codec is dependent the hypothesis that perceived quality can be improved by allowing impairments during less critical dialog activities. This hypothesis was tested experimentally by impairing audio according to two prioritization schemes: one that is sensitive to local word importance and places fewer impairments in these regions and one that evenly distributes impairments over all spoken portions of dialog. Subjects were asked to rate their perception of each of the prepared audio segments using the standard Mean Opinion Score (MOS). Preliminary results confirm the hypothesis, that importance-adaptive packet prioritization can indeed improve the quality of audio transmitted over packet-switched networks. This represents a novel way of mitigating an overall loss of perceived quality in voice communication due to impairments resulting from dropped packets.

Funding Source: NSF Grant IIS-1241434

Recommended Citation:
Mann , Winston ; Ward , Nigel . "An experimental investigation of a packet prioritization method for voice communication" (2013). COURI Symposium Abstracts, Summer 2013, ID= 286

Incorporation of 3D additive manufacturing with printed electronics

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3D additive manufacturing has begun to confluence with printed electronics and in the near future might be accomplished simultaneously. This idea will be a revolutionary change for design and manufacturing in upcoming years. The capability of producing efficient electronics into complex-shaped structures using additive manufacturing allows numerous benefits including material efficiency, and cost-effectiveness. These benefits arise because mechanical structures become lighter, and printing directly into a surface frees up space for additional payload. Merging both additive manufacturing and printed electronics was completed through stereolithography and nScrypt technologies at the W.M Keck Center for 3-D Innovation. The completion of a light structure known as a bucky ball made out of NeXt resin from DSM Somos was produced with the necessary components from an RC Air Hog Helicopter to make it fly. A wireless camera was incorporated through direct-write polymer silver ink using the nScrypt technology in order to perceive the difference in weight and space availability of the structure.

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

Recommended Citation:
Montes , Jessica ; Medina , Francisco ; Wicker , Ryan . "Incorporation of 3D additive manufacturing with printed electronics" (2013). COURI Symposium Abstracts, Summer 2013, ID= 232

Essay grading automation through machine learning algorithms

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Educators at all levels of education spend significant amounts of time on the grading of homework assignments. With recent advances in natural language processing, it has become feasible to use computer software to automatically assess the quality of essay-based assignments, reducing the time commitment for professional graders. Previous research has focused on the evaluation of lengthy, college-level essays such as the Graduate Record Examinations. In this project, we focus on automatically grading short essays written by elementary school students in the U.S, which provides the extra challenges of working with little information and often a number of spelling and grammatical errors not found in higher-level essays. We represented the essays using the following techniques: bag-of-words, standard spell check, Levenshtein distance spell check, average sentence length, average word length, and the number of words in an essay. We experimented with various learning algorithms, with special focus on k-nearest neighbors and locally-weighted learning algorithms. With a range of grades from 0 to 10, we were able to evaluate essays to within 0.41 of the score assigned by professional graders. This level of accuracy is comparable to the usual disparity found between two human graders. With the results being as reliable as they are, it is conceivable that our techniques can be used by professionals, freeing up large portions of teachers' exceedingly valuable time. Current and future work focuses on reducing the number of essays that a human grader has to grade in order to provide enough training data for a learning algorithm.

Funding Source: NSF

Recommended Citation:
Morse , Anthony ; Tafoya , Emmanuel ; Aguirre , Diego ; Fuentes , Olac . "Essay grading automation through machine learning algorithms" (2013). COURI Symposium Abstracts, Summer 2013, ID= 284

Spectral analysis of facial skin: detecting emotional state

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Human emotion detection has attracted increasing attention in the computer vision and machine learning communities due to many potential applications, including security and law enforcement, human computer interaction, health care, and computer graphics. In this project, we are developing a new method for spontaneous emotion detection based on analysis of changes in facial skin color. Due to changes in a person's emotional and physical state, the concentration levels of hemoglobin and oxygenation under the skin vary, which in turn produces subtle changes in the hue and saturation components of the skin color. We hypothesize that these small changes can be reliably detected in an automated way using a combination of computer vision and machine learning algorithms. We are using color histograms computed from the cheeks and forehead areas of the facial image as descriptors and then applying instance-based learning algorithms to try to predict the person's emotional state from these features. To test this method, we are creating a database of videos of people displaying various types of spontaneous emotions. We first created a database with video clips that serve as neutral, positive and negative stimuli. We then recorded the subject's reaction to those video clips, using a regular digital camera. We manually extracted images with the subjects' strongest reaction to the stimuli and classified the reaction as either a positive, negative or neutral emotional state. We are currently working on the quantitative evaluation of the proposed method on this dataset.

Funding Source: National Science Foundation

Recommended Citation:
Ordonez , Juanita ; Ramirez , Geovany ; Jimenez , Maria ; Fuentes , Olac . "Spectral analysis of facial skin: detecting emotional state" (2013). COURI Symposium Abstracts, Summer 2013, ID= 268

Carbon fiber reinforced polymer composites fabrication and testing

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Carbon fiber reinforced polymer composites provide a unique combination of high strength, low weight and chemical stability. One of the major drawbacks of this type of composites is high cost: it is as much as 5 times more costly than steel, the most commonly used structural materials. Therefore, it is important to design the right amount of material for any specific given application. Therefore, this research is focused on the objective of providing a greater insight of the mechanical properties of carbon fiber reinforced composite materials and correlate them with the influence and dependence of fabrication parameters. The fabrication parameters observed here are the most crucial for industrial applications and structural integrity, including number of layers, fiber orientation, and volume fraction. To obtain the best properties in the material, a combination of pressure and heat is implemented by the usage of a vacuum bagging system and a conventional oven. In this set of experiments, high temperature resin is being used due to its high stability. Additionally, post cure treatments are enforced to secure the maximum state of stability in the polymer matrix. Testing will be focused mainly on tensile strength as carbon fiber is mostly employed for application in shell elements. A set of concomitant experiments will be realized accounting for different geometries and combination of fabrication parameters.

Funding Source: Provost Office

Recommended Citation:
Orea-Amador , Leonardo ; Karim , Hasanul ; Gaytan , Sara ; Rumpf , Raymond ; Delfin , Diego ; Lin , Yirong . "Carbon fiber reinforced polymer composites fabrication and testing" (2013). COURI Symposium Abstracts, Summer 2013, ID= 279

Assessing the effect of JPEG compression on computer vision algorithms

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JPEG is the most commonly-used method for digital image compression. While it provides large savings in terms of storage requirements, JPEG also reduces the quality of images; the degradation can appear as macro blocks, noise around sharp edges, and color quantization. The goal of this project is to evaluate the effects of the presence of JPEG-induced artifacts in the performance of common computer vision algorithms. We studied the effects of JPEG artifacts in low quality images in the detection of human faces and eyes. The data results for true positives, false positives and false negatives of the experiments conducted gave us the information needed to assess detection and tracking performances based on precision, recall, and f-measure. The methods used for detection and tracking implemented learning algorithms based in a cascade of boosted classifiers working with Haar-like features that were trained with thousands of positive and negative examples of human faces and eyes. We found that compression quality has little effect on the detection of human faces as long as the algorithms use a large amount of images that have undergone JPEG compression as training data. When the objects of interest are small, the detector's performance is poor, even if the image quality is high. Currently we are exploring the effect of compression on other vision algorithms, including stereo reconstruction and object recognition.

Funding Source: NSF Grant IIS-1241434

Recommended Citation:
Padro Juarbe , Cristina ; Ramirez , Geovany ; Fuentes , Olac . "Assessing the effect of JPEG compression on computer vision algorithms" (2013). COURI Symposium Abstracts, Summer 2013, ID= 289

Electroless metal coatings of CoMoS2/Na2SiO3 and CoMo/CTAB

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Wearing defects is one of most common cause of failure in materials, primarily for mechanical metal-based parts. The understanding and tribological aspects is of high relevance, as well to find new tribological materials for metal coatings. In here an Electroless deposition to achieve a surface coating using Cobalt/Molybdenum di-Sulfide is presented. The coatings were made over (98%) copper laminates using two different chemical solutions of CoMoS2/Na2SiO3 and CoMo/CTAB . Both depositions were completed over a 24 hour period and subjected to heat treatment using a ramp rate of 100 C, and using a two-dwell times of 1 hour at 450 and 550 C respectively for crystallization/solidification purposes. Results from Scanning Electron Microscopy indicate a sponge-like structure for CoMo/CTAB and characteristic honey-comb structure for CoMoS2/Na2SiO3 as dispersed over the copper metal plates as well from Energy Dispese Scanning indicate the presence of Co, Mo and S elements dispersed over the area. X-ray characterization indicates the creation of new phase, which is caused due to heat treatment process. Further work will include to subject to mechanical test by meaning of nanoindentations over the surface in order to obtain the stress-strain relationships on coatings.

Funding Source: Materials Research and Technology Institute

Eliminating the effects of JPEG compression using machine learning

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The most common format for digital image compression is JPEG. It compresses 8 by 8 pixel blocks using the discrete cosine transform (DCT) and quantizing pixel information to reduce the size of files. Because of this technique's design, blocking artifacts are created when heavy compression is done, since the DCT is local to each 8 by 8 block. The goal of this research project is to develop an algorithm to eliminate the blocking artifacts created by JPEG compression while preserving its advantages in terms of reduced storage requirements. We are using machine learning techniques to estimate the actual (before compression) values of pixels located at the boundaries of the 8 by 8 JPEG blocks, trying to recover the information that is lost due to compression. We trained a neural network for each dimension in the Y-Cb-Cr color space, considering horizontal and vertical pixels as separate data. The attributes for each training example were pixels in the neighborhood of the target pixel; we experimented with neighborhoods of size 3, 9, 25, and 49. Our preliminary experimental results show that our neural network provides a reduction of 3.3% in the errors introduced by compression. We are currently exploring several methods to further reduce this error.

Recommended Citation:
Quijas , Jonathan ; Fuentes , Olac . "Eliminating the effects of JPEG compression using machine learning" (2013). COURI Symposium Abstracts, Summer 2013, ID= 280

Making energy more efficient: Development of a new drag model for the prediction of flow behavior of irregularly shaped particles

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Recent trends toward efficiency improvement and global awareness of climate change caused by CO_2 emission into the atmosphere have led to a renewed effort in the development of more efficient and less environmentally harmful power generation systems. Clean coal technologies, which represent a significant portion of U.S. government funded technology programs, have centered a portion of their research on better understanding of multiphase flows in gasifier units. Direct examples include gas-solid fluidized beds, which are used in many systems such as in Integrated Gasification Combined Cycle power plants or chemical looping systems. These units can be improved through an enhanced understanding of the physical mechanisms occurring within them which involve multiple scales, interaction of phases, and in many cases large variations in the particle shapes. Most past experimental and computational efforts were focused on spherical particles whereas in most fossil-fuel processes, such as gasification and pyrolysis, the particles are often non-spherical

The overall project goal this summer was to gain practical experience using high speed camera in the development of a particle drag model and then implement the empirical model into a computational code. Derived empirical relationships and multiphase non-spherical particle velocities were used in Fluent computational code. The model was established including boundary and initial conditions, grid and assumptions. Prediction performance of the model was compared to other drag relationships available in literature and found to be an improvement.

Funding Source: UTEP Provost's Summer Student Research Assistant Program

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Recommended Citation:
Rodarte , Christian ; Chowdhury , Raufur ; Love , Norman . "Making energy more efficient: Development of a new drag model for the prediction of flow behavior of irregularly shaped particles" (2013). COURI Symposium Abstracts, Summer 2013, ID= 138

Computer simulations of material strength

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The Strain Rates of Ta have been physically tested successfully up to 10^9 s^{-1} using multi-million dollar procedures at the National Ignition Facility in Northern California. Since experimentally testing metals and alloys is expensive, computational models have gained attention. A defective body-centered cubic crystal systems of 78750 atoms of Ta is tested by using molecular-dynamics simulations. The simulations are quasi-isentropic and cause homogeneous deformations. By using this method, the strain rates of alloys can be calculated at various compression percentages to test its high pressure strength. On the atomic scale, when pressure is placed on the crystal, the atoms behave similar to fluid which is expressed using the concepts of Laminar Flow. The results of the strain rates vs shear stress of Ta are expected to graphically follow a line that differs from experimental models in the span of 10^{-9} to 10^{-12} s^{-1}. This research focuses on the yield point at which a tantalum crystal's deformation changes from an elastic deformation, to a plastic one.

Funding Source: NSF

Recommended Citation:
Vasquez , Anthony ; Gaglione , Jethro ; Ravelo , Ramon . "Computer simulations of material strength" (2013). COURI Symposium Abstracts, Summer 2013, ID= 266

Environmental and Geological Sciences

In search of Chagas disease in the Chihuahuan Desert – TX

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Chagas Disease is endemic in Latin America. Nonetheless, recently have been reports of isolated cases in border towns along the US/Mexico border. This is a vector-borne disease caused by the protozoan parasite *Trypanosoma cruzi* (*T. cruzi)* and transmitted by Triatominae insects known as the "kissing bug". The purpose of this project is to determine the presence of *T. cruzi* in the Chihuahuan Desert and to identify the species of triatominae carrying parasite in the region. The triatomines were collected at the UTEP-Indio Mountain Research Station and stored in 95% ethanol at room temperature. Thirty nine kissing bugs were dissected, the GI was isolated, and followed by gDNA purification. The oligonucleotides 121 and 122 and mtCytBR01 and mtCytBR02 were used to amplify by PCR the specific *T. cruzi* mini-exon fragment and to identify the triatominea, respectively. The PCR products were purified. The next step will be ligation in pGEMT. *E. coli* DH5 will be transformed and plated into LB/amp/IPTG/X-gal plates. The positive clones will be sequenced. After sequencing, we will be able to confirm or not the presence of the parasite and the species of the triatominae. Results are still pending, as the experiments are still ongoing. If we are able to confirm the presence of the parasite in the Chihuahuan Desert, then we can conclude that the disease is present in this region of the United States.

Funding Source: National Science Foundation

A Survey of lizard malaria in the Southwest United States

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Malaria parasites are a diverse group with more than 170 described species that exploit birds, mammals and, in particular, reptiles as vertebrate hosts. In the Southern United States, three species of malaria have been identified in lizards (*Plasmodium mexicanum*, *P. floridense*, and *P. chiricahuae*) based on the morphology of parasites detected in the blood of lizards. Limited observations suggest that the vectors of lizard malaria are mites rather than mosquitoes. A high infection rate of *P. chiricahuae* has been reported in the Crevice Spiny Lizard (*Sceloporus poinsetti*), but only one of the many individuals of Tree Lizard (*Urosaurus ornatus*), sympatric to the Crevice Spiny Lizard, was found to be infected. Our research aimed to survey *S. poinsetti* and other species of lizard collected near El Paso, Texas for evidence of infection with *P. chiricahuae.* This was accomplished by preparing thin blood smears from the collected lizards and scanning them for parasites under a microscope. We will also use an 18S ribosomal RNA gene sequencing kit to test for *Plasmodium* in tissue and blood samples from these lizards. We will also be collecting mosquitoes and mites from lizards to determine the presence of *Plasmodium* species. We are still collecting lizards and analyzing samples. Malaria parasites have not been detected. We will continue to test our hypothesis that only *S. poinsetti* serves as a reservoir for malaria while other species are resistant to the parasites. This may lead to future studies that prove important for the prevention of human malarias.

Funding Source: NSF

Recommended Citation:
Gibson , Andrew ; Lynn , Jordan ; Lieb , Carl ; Watts , Doug . "A Survey of lizard malaria in the Southwest United States" (2013). COURI Symposium Abstracts, Summer 2013, ID= 276

An ecogeographic analysis of the avifauna on Indio Mountains Research Station, Hudspeth County, Texas

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This study augmented an ecogeographic analysis of avian preference of habitats found in a Chihuahuan Desert landscape on Indio Mountain Research Station, Hudspeth County, Texas. It took place from 3 June-28 July 2013, which expanded the focus from a previous study to include birds utilizing the open desert, which in conjunction with the other sites can identify habitat bias in respect to why particular species are present. The hypotheses for the study include: there will be a variance in avian richness between different sites, similarity between sites will decrease from permanent to temporary wetlands, and the Ranch House will exhibit greatest species richness.

Twice each day for 18 days, two bird survey locations in the open desert and around the Ranch House were used to conduct 24 point counts. Surveys ran 20 minutes from about one-hour after sunrise and one-hour before sunset. Species richness was recorded from those two sites and the Ranch House and compared to data from other sites in 2012 during same time period. Pair-wise similarity in bird species between all sites will be measured using Simpson's Coefficent and a UPGMA phenogram will be generated depicting overall similarity in a hierarchical fashion. Comparison between plant similarity and bird similarity between sites will also be presented.

Funding Source: National Science Foundation

Recommended Citation:
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Updating geologic events of the terrestrial planets and the moon on a national planetary poster

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Scholarship recipients of the METALs program in the Geological Sciences Department at UTEP were tasked with researching technical papers on google scholar and other search engines to update an outdated planetary poster. They added information they researched based on geologic events that occurred during specific periods and epochs of Mercury, Mars, and the Moon. Such information provided by discoveries of rovers and satellites, such as newly formed craters, evidence of water among others. Students focused on the timeline originally used on the poster. We hope to complete the project and present the final poster to the National Science Foundation by the end of August.

Funding Source: NSF

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

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We are using geophysical methods to understand 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 the ability of the soils 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 analysis of soil cores and continuous soil moisture/salinity/temperature monitoring at the site.

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Localization of the glycinergic cells in the retina of reptiles from the Chihuahuan Desert

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The central nervous system is a major system which responds to either internal or external stimuli using signaling molecules known as neurotransmitters. These signals are regulated by the presence of specific transporters for the different neurotransmitters. The neurotransmitters and their transporters are involved in the regulation of many different functions such as pleasurable emotions, muscle stimuli, learning, memory, pain perception, and vision. In this project, we are characterizing the location of glycinergic cells in the reptile and amphibian retina. We hypothesize that the location of the Glycine Transporter 1 (GlyT1) in the retina of these organisms is in amacrine neurons, similar to location in the mammalian retina. Preliminary published studies from other research group suggest that GlyT1 in reptiles is in glial cells rather than neurons. To support our hypothesis, we are using hemisection of the eyes from snakes combined with immunocytochemistry/ immunofluorescence techniques and detection of the following markers: GlyT1, GAD67, and GlyR. These experiments should shed light into the location of glycinergic neurons and provide evidences of a glial or neuronal location.

Funding Source: NSF

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Initial cytoarchitectonic characterization of the forebrain of the Western diamondback rattlesnake, Crotalus atrox

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The Western Diamondback rattlesnake, *Crotalus atrox*, occupies a diverse range of environments, from mesic regions throughout Central Texas, to more arid regions including the Chihuahuan Desert region of West Texas. *C. atrox* is rarely studied and little is known about its behavior, environmental adaptations and neuroanatomy. This project aims to use basic structural cell staining of coronal sections to create the first complete brain atlas of *C. atrox*. The forebrain and hindbrain of a male *C. atrox* specimen obtained from the Indio Mountain Research Station, after being immersion-fixed in a 4% paraformaldehyde solution and frozen in hexane, were both sectioned at twenty microns and collected into four series. The first series of the forebrain was stained for Nissl substance, which provides the general cellular organization, or cytoarchitecture, of each tissue section. By staining for forebrain cytoarchitecture, we hope to find regions in *C. atrox* brain homologous to mammalian brain structures and other reptilian structures previously mapped by other researchers. Through this comparative process we can begin annotating the general brain regions delineated by the Nissl staining and prepare immunocytochemical experiments in the future. While we are currently troubleshooting issues related to fixation of the tissue for immunocytochemistry, we hope to obtain a structural outline that will provide the first descriptions of brain organization in this important reptilian species.

Funding Source: National Science Foundation

Recommended Citation:
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Species composition of aquatic invertebrates in dust and wetlands in the northern Chihuahuan Desert

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Diapausing eggs and desiccated stages are produced by aquatic organisms in response to harsh environmental conditions. For desert species, they also function as a means of dispersal by wind. We examined whether resting stages were equally prevalent in sediment egg banks and dust collected during wind events in the northern Chihuahuan Desert. Sediment samples from five ephemeral water sources in the Chihuanhuan Desert were rehydrated and the species composition of organisms found from these areas were compared with the species found in rehydrations of dust collected from the Biology Building rooftop at the University of Texas at El Paso. Currently, a total of 22 species have hatched from the sediments. Most samples had similar hatching phenology. Ciliates emerged first from diapause, and within 48 hours, 1-7 other species had hatched. Peccary Tank had the highest species richness, including 10 rotifer species, and most hatching declined after 7 days. Columbus Playa sediments yielded only 1 rotifer species but numerous large brachiopods, ostracods and cladocerans. Tule Tank had rotifers, cladocerans, and ostracods, but unlike the other samples, no brachiopod larvae. All the samples contained very different communities, which also varied from the rooftop dust samples. DNA sequencing on the CO1 gene and ITS region is being conducted to determine the potential source populations of these species. These results will inform our understanding of levels of biodiversity in at-risk desert aquatic habitats and the role of wind as a vector of dispersal.

Funding Source: NSF

Geochemical characterization of groundwaters in Dockum Aquifer of Midland Basin, TX

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Fuel demand in the U.S. has risen over the decades. This has caused energy companies to explore new methods of producing energy. One method is hydraulic fracturing which releases oil and gas by pumping water down inside the earth to fracture shale rocks and retrieve gas. The use of fresh water for hydraulic fracturing is an issue in west Texas due to agricultural farms and their need of fresh water for irrigation. This area is also the host to many cities and their habitants which also require water to survive. This part of Texas has been in a drought for many years, one classified as the worst since the Dust bowl of the 1930's. The lack of water leaves oil and gas companies in a tough position as they are not able to produce a good economic amount of fuel without hydraulic fracturing.

Since fresh water is limited in the southwest, brackish water has been proposed as an alternative. Groundwater samples from the Dockum group of the Permian Basin in west Texas were analyzed using alkalinity titration. Their chemical data was understood using geochemical models from the PHREEQC software which gave the mineral saturation indices. I will present the results of this data which will help to determine if the brackish water from the Dockum Aquifer is in good standing to be treated and used in hydraulic fracturing. The outcome would be beneficial to oil and gas companies, as well as saving freshwater for agricultural farms and cities.

Recommended Citation:
Sosa , Emmanuel ; Reyes , Francisco ; Engle , Mark ; Jin , Lixin . "Geochemical characterization of groundwaters in Dockum Aquifer of Midland Basin, TX" (2013). COURI Symposium Abstracts, Summer 2013, ID= 269

Population genetics of the Chihuahuan Desert endemic living rock cactus (Ariocarpus fissuratus var. fissuratus)

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Ariocarpus fissuratus var. *fissuratus* (Cactaceae), the living rock cactus, is an endemic species to the Chihuahuan Desert. It is most commonly found on hills or ridges with limestone soils associated primarily with the Southern Rio Grande from the Big Bend Region as far south as McAllen, TX, but also found in disjunct northern populations of southern Hudspeth county. *Ariocarpus fissuratus* var. *fissuratus* is often poached for anthropogenic uses (novelty ornamentals and perceived hallucinogenic properties), making it a potential conservation concern. The goal of the current study was to compare the northern most populations of *A. fissuratus* var. *fissuratus* at Indio Mountain Research Station (IMRS) to the disjunct southern populations found primarily in the Big Bend region to achieve a better understanding ofgenetic variability between and within its populations. We hypothesize strong genetic structure between the disjunct northern and southern populations due to lack of gene flow. A population genetic analysis was conducted using extracted DNA of 20 individuals from 5 populations each from both IMRS and the Big Bend region. Multiple polymorphic microsatellite loci were genotyped and highly variable chloroplast DNA regions were sequenced to examine population level genetic variability. Botanical surveys using quadrat sampling for each population were also conducted and compared between populations. This data should allow us to assess the viability of this species by better understanding the level of gene flow and genetic variabiltiy within and among populations. Our research will be able to serve as background for future conservation efforts.

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Vahsen , Megan ; Moody , Michael . "Population genetics of the Chihuahuan Desert endemic living rock cactus (Ariocarpus fissuratus var. fissuratus)" (2013). COURI Symposium Abstracts, Summer 2013, ID= 212