BOOK OF ABSTRACTS

COURI CAMPUS OFFICE OF UNDERGRADUATE RESEARCH INITIATIVES

UTEP

BOOK OF ABSTRACTS

SPRING 2017

COURI SYMPOSIUM

April 28-29, 2017

Laura A. Diaz-Martinez, Editor
Karina Canaba, Associate Editor
Nallely Medina, Assistant Editor

EDITOR'S NOTE

The Annual 2017 Spring Symposium highlighted the work of 124 undergraduate presenters performing research, scholarly or creative activities at UTEP. These students represented 25 departments from the Colleges of Education, Engineering, Health Science, Liberal Arts and Science, as well as the Schools of Pharmacy and Nursing.

The Spring Symposium encompassed two events. The Department of Music 2017 Honors Recital, which took place on Friday April 28 and featured four undergraduate and three graduate artists and composers. The poster and oral presentations took place on Saturday April 29, and featured 120 undergraduates presenting their projects in a variety of disciplines from the Arts and the Humanities to the Life, Social and Applied Sciences.

The high quality of the projects and enthusiasm of the students, together with the participation of faculty, staff and graduate students who volunteered as judges, made the Symposium a success. Participation of students from diverse disciplines signals campus-wide engagement of students in research, scholarly and creative projects and a commitment from UTEP faculty to providing avenues for students to engage in this high-impact experience.

Laura A. Diaz-Martinez, Ph.D.
COURI Associate Director
May 1, 2017

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MISSION

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

COURI CAMPUS OFFICE OF UNDERGRADUATE RESEARCH INITIATIVES

PROGRAM AGENDA

Friday April 28, 2017		
1:30 pm – 3:00 pm	**Department of Music 2017 Honors Recital**	Fox Fine Arts Recital Hall
Saturday April 29, 2017		
11:00 am – 12:15 pm	**Poster & Oral Presentations: Session A**	UGLC Lobby
12:30 pm – 1:45 pm	**Poster & Oral Presentations: Session B**	UGLC Lobby
1:00 pm - 2:00 pm	**Eminent Guest Speaker**: Chris Reyman, D.M.A. "*Creating Music for Film*" Assistant Professor of Commercial Piano Department of Music The University of Texas at El Paso	UGLC Room 128
3:15 pm – 4:00 pm	**Awards Ceremony and Concluding Remarks**	UGLC Lobby

EMINENT GUEST SPEAKER

Abstract

Get a behind-the-scenes look into my creative process for composing film music - from my first composition for the animated short film, *Pigeon Impossible,* to my more recent projects, including the music for the award-winning animated short film *The OceanMaker*. I will discuss how I use an "improviser's mind" in my research, an approach that enables me to be successful at a wide variety of creative activities, ranging from completely improvised performances to fully composed pieces. In my experience, maintaining an improviser's mind better equips people to respond to challenges in a positive and creative way by focusing on the process and collaboratively building with what's available. I have found these skills to be beneficial not only in the arts and research, but also as an approach to life.

Biography

Dr. Reyman is Assistant Professor of Commercial Piano at The University of Texas at El Paso. He obtained his B.M. in Commercial Music from Millikin University in Decatur Illinois, and his M.M. and Doctorate in Musical Arts in Jazz Performance from the University of Illinois Urbana-Champaign. Chris is also co-founder and Assistant Director of in2improv, an organization that brings professional artists and art educators together with at-risk populations in our border communities to promote artistic and social development through programs, workshops, classes and performances. He has a long list of performances in the U.S., Latin America, Europe and even in Bali, Indonesia. One of his most recent projects is KOAN an interdisciplinary improvisation ensemble that is pushing the boundaries of music and dance by blending sound and movement in their improvisational performances. Dr. Reyman is a prolific composer who has written works for jazz ensembles, improvising ensembles and orchestras, as well as numerous scores for films that have been shown at over 100 film festivals in 25 countries, including two award winning animated films Pigeon: Impossible and The OceanMaker. Dr. Reyman was invited to join the Pi Kappa Lambda National Music Honors Society in 2014 in recognition of all of his accomplishments.

ACKNOWLEDGEMENTS

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Richard Adauto, Executive Vice-President
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Gary Edens, Vice-President for Student Affairs
John Wiebe, Associate Provost for Research

Faculty Mentors

Special thanks to all faculty members who mentored students presenting at this symposium for their continuous dedication to the mission of undergraduate research, scholarly & creative activities.

Volunteer Judges

Special thanks also to all faculty, staff and graduate students who volunteered to serve as judges during the Symposium. Your enthusiasm about undergraduate research, scholarly & creative activities motivates presenters and creates a campus-wide culture of undergraduate research

Funding Support for Student Research

UTEP Campus Office of Undergraduate Research Initiatives (COURI)
UTEP On-Campus Student Employment Program
UTEP Office of Research and Sponsored Projects (ORSP)
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UTEP Interdisciplinary Research Fund
UTEP Department of Geological Sciences
UTEP MIRO Center for Space Exploration and Technology Research (cSETR)
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National Institutes of Health (NIH)
National Institutes on Minority Health & Health Disparities (NIMHD)
National Institute on Drug Abuse (NIDA)
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United States Department of Education
United States Department of Agriculture (USDA)
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2017 DEPARTMENT OF MUSIC
HONORS RECITAL PROGRAM

^ undergraduate student

Suite No. 2 for Solo Cello
1. Prelude
2. Courante
J.S. Bach (1685-1750)
Nathan Black, cello

Awareness (text by Silvia Stults)
Robert Loya^ (b. 1990)
Jamille Brewster, voice
Dr. Dominic Dousa, piano

Pi Kappa Lambda Inductees
Presented by Dr. Dena Kay Jones
Jamille Brewster
Sandra Rivera
Michelle Shaheen

"Et la lune descend sur le temple qui fut" (and the moon descends upon the temple that was) from *Images*, Book II
Claude Debussy (1862-1918)
Isaac Drewes^, piano

Centennial Horizon
Kevin McKee (b. 1980)
Isaac Ponce^, trumpet
Guillermo Gutierrez, piano

"It's hard to speak my heart" from *Parade*
Jason Robert Brown (b. 1970)
John Guevara, voice
Patricia Ann Provencio, piano

"Echo, viens sur l'air embaume" from *La Jolie Fille de Perth*
Georges Bizet (1838-1875)
Jamille Brewster, voice
Patricia Ann Provencio, piano

Outstanding Music Students
Presented by Dr. Stephen Nordstrom, Dr. Oscar Macchioni

Eduardo Garcia, Outstanding Senior in Music Education
Emily Mathews, Outstanding Senior in Music Education
Miguel Maldonado, Outstanding Senior in Commercial Music
Suad Guerra Mena, Outstanding Senior in Music Performance
Jamille Brewster, Outstanding Graduate Student in Music Performance
Kathryn Andrade, Outstanding Graduate Student in Music Performance

MUSIC PROGRAM NOTES

Frédéric Chopin's Nocturne op. 15 no. 2 Performed as a Transcription for Flute & Piano

Matthew I Pena[1^], Pat Provencio[2], Melissa Colgin-Ablen[1]*

[1] *Department of Music, The University of Texas at El Paso.*
[2] *Musical Director, UTEP Dinner Theatre & Staff Accompanist, The University of Texas at El Paso.*

The number of solo pieces composed specifically for the flute is relatively small when compared to the scores of works for violin or piano, but thanks to transcriptions (arranging a musical piece, originally composed for one instrument or ensemble, to another) flutists have a wealthier performance repertoire. For today's performance, The Nocturne in F# Major op. 15 for piano of the celebrated Romantic composer Frédéric Chopin (1819-1849) illustrates a successful (and important) transcription for flute and piano by French flutist and composer Paul Taffanel (1844-1908) at the turn of the twentieth century. Taffanel places the principal melodies of Chopin's dreamy "night piece" with the flute and allows the piano to keep the broken-chord accompaniment intact, beautifully honoring the original composer's musical intentions. The ternary (ABA) form's outer sections are cast in a slow, Larghetto tempo, offering the flutist ample opportunity to demonstrate Chopin's famous style feature of tempo rubato (robbed time) as the tempo stretches momentarily for long ornamental streams. The contrasting B section increases musical tension by accelerating the tempo with dramatic contrasts in dynamics. The return of the Larghetto theme bids a somber farewell. What Chopin conceived for pianists, Taffanel recolors for the flute-piano duo in good taste. Matthew Pena is a senior music education major in the flute studio of Dr. Melissa Colgin Abeln. Matthew is a three-year member of the UTEP Marching Miner Band and performs currently with the University's Orchestra, Symphonic Winds, and Flautistas.

Recommended Citation:
Pena, Matthew; Provencio, Pat; Colgin-Ablen, Melissa. "Frédéric Chopin's Nocturne op. 15 no. 2 Performed as a Transcription for Flute & Piano" (2017). ***COURI Symposium Abstracts, Spring 2017*****, ID= 1099**

True essence

Isaac P Drewes^, Dena K Jones*

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

Debussy is an Impressionist composer who was extremely influenced by the Impressionist poets and painters. He is best–known for his compositions for piano solo. *Et la lune descend sur le temple qui fut* (And the moon descends on the temple that is no more) is a beautiful and haunting piece that is part of a six-piece set called *Images.* Debussy said that his goal for *Images* was to try to search "for the inexpressible, which is the ideal of all art." *Et la lune descend sur le temple qui fut* is a quiet tone poem for piano, as the music relates to the title of the piece, and truly sets up this world of "the temple that is no more." It's as if the music is recalling the mysterious past–life of this ancient, abandoned, maybe even once sacred temple, but it cannot because this knowledge has been lost forever. Today's pianist believes true beauty does not lie in trying to discover lost knowledge but rather in humanity's ability to create things like this temple or music or books or art and to see these creations outlast us in our own lifetimes and extend for many lifetimes to come. Towards the end of the piece, it seems to no longer be focused on what once was but on what is to come; for the pianist, it is a contemplative, astrological, mystical, almost transcendental work of music.

Recommended Citation:
Drewes, Isaac; Jones, Dena. "True essence" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1097

Centennial Horizon By Kevin McKee

Isaac M Ponce[^], Nancy Taylor*

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

Centennial Horizon is an homage to the beauty and wonder that is the state of Colorado. The first movement: "Aspen Grove" captures the quiet yet enriching beauty that is found in the woods of Colorado. Its beautiful melody soars through the air and brings imagery of forests, wildlife, and the tranquil beauty that is nature. The second movement, "Roaring Gunnison" pays homage to the powerful Gunnison River in Colorado. With its rushing tides and powerful current this river reminds us that nature does not hold back. The young American composer, Kevin McKee brilliantly captures the exciting and thrilling rush of being on the Gunnison with fast technical passages and exciting melodies while subtly alluding to the themes from the first movement. In the words of the composer, "I have attempted to capture some of the beauty and adventure of what truly is an amazing place: Colorado, *The Centennial State*.

Recommended Citation:
Ponce, Isaac; Taylor, Nancy. "Centennial Horizon By Kevin McKee" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1098

Awareness, a song written to raise awareness of our environment

Robert Loya[^], Dominic Dousa*

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

This piece was inspired by the issues going on with the Dakota pipe lines protests that started around July 2016. It was not composed to protest the pipeline, but to raise and spread some kind of awareness on the effect we are are having on our planet. The poem I used is *Awareness About Our Environment* by Sylvia Stults. When writing the music, I used the poem as a guide and used musical motivic ideas to somewhat represent what is being said in the different stanzas. As the poem gets more intense so does the music. An example of this is toward the end of the piece, when the poem presents some kind solution and says " Like raise the awareness" the music becomes a bit more uplifting and light. Then turns back to something more heavy and dark when we reach " That if we don't heed the problem". The piece will be performed by; graduate student Jamille L. Brewster on voice, and UTEP faculty, professor Dominic Dousa, D.A, on piano.

Recommended Citation:
Loya, Robert; Dousa, Dominic. "Awareness, a song written to raise awareness of our environment " (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1100

2017 SPRING SYMPOSIUM TECHNICAL PROGRAM

ORAL PRESENTATIONS

1A Vocal timbre and color terminology in the female voice
*Jasmine Fernandez^, Blythe Cates**

2A Daesh: A Threat to Cultural Security
*Victor Hurtado^, Damien Van Puyvelde **

3A The Experiences and Perspectives of Latinas in the U.S.
*Tania Mariscal Quintana^, Stacey Sowards**

4A Developing PAVEMENT (Paratextual Verse in Early Modern English Texts)
*Carmen Ordaz^, Andrew Fleck**

5A Creation of a virtual theatrical simulator for stage managers
*Mayra Rodarte^, Janet Hill, Yahaira Reyes, Orlando Gordillo, Carolyn Cubit-Tsutsui **

1B Doctor, doctor, give me the news: generalists versus specialists in the infertility diagnostic process
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2B Life Course and Ecology of Homelessness
*Jessica Morales^, Yok-Fong Paat**

3B Story telling by an exemplary scientist to engage high school students in scientific practice
*Vania Ochoa^, Pei-Ling Hsu**

4B Graphic anthropology: the re-integration of drawing in the anthropological toolkit
*Daniella Pablos^, Guillermina Nuñez-Mchiri**

5B Transform students' learning motivation from extrinsic to intrinsic through cogenerative dialogues
*Yamile Urquidi^, Pei-Ling Hsu**

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SESSION A

^ Undergraduate presenter, * Faculty mentor

1A Pump-probe spectroscopic studies of surface plasmon resonance of gold nanorods
*Angela Aguilar^, Yu Ding, Chunqiang Li**

3A Generating pairwise-covering test suites for problems with uneven numbers of parameters' values
*Cristian Ayub^, Miguel Zamudio Arias, Martine Ceberio**

5A English and Spanish Language Sample Measures in Bilingual Preschool Children
*Isabel Cano ^, Adriana Garcia^, Connie Summers , Vannessa Smith**

7A Characterization of the pyroelectric coefficient of a high temperature sensor
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8A Evaluating the implementation of the culturally adequate birth in the Hospital of Pelileo, Ecuador from June to July 2016
*Norma Cervantes^, Rebecca Perez^, Edith Hernandez, Marina Villacis, Octavio Miranda**

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*Carmen Chavez^, Paulette Ramirez^, Josh Melendez, Nicholas Rosales, Luis Barrera, Juan Noveron**

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17A Sulfonated resorcinol-formaldehyde microspheres for the adsorption of methyl orange and methylene blue from water
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19A Fracture resistance of polymer-bonded explosive simulant using the semi-circular bend test
*Robert Mach^, Fazle Rabbi, Calvin Stewart**

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2017 SPRING SYMPOSIUM PRESENTER AWARDS

Applied Sciences

Best presentation	Honorable mention:
Rebeca A. Perez Mentor: Gabriel Ibarra-Mejia	Cristian Orozco Mentor: Chintalapalle Ramana

Arts and Humanities

Best presentation	Honorable mention:
Mayra Rodarte Mentor: Carolyn Cubitt-Tsutsui	Esai Cantu Mentor: Dominic Dousa

Life Sciences

Best presentation	Honorable mention:
Caroline Hernandez-Casner Mentor: Katherine Serafine	Suleney Medina del Valle Mentor: German Rosas-Acosta

Physical Sciences

Best presentation:	Honorable mention:
Guadalupe Alvarez Rodriguez Mentor: Hugo A. Gutierrez	Paola I. Soto-Montero Mentor: Lixin Jin

Social Sciences

Best presentation:	Honorable mention:
Gabrielle Mendoza Mentor: Jessica Shenberger-Trujillo	Paola M. Gama Mentor: Pei-Ling Hsu

HUMANITIES, CREATIVE AND PERFORMING ARTS

Mercurial

Esai Cantu^, Dominic Dousa*

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

My project is a musical composition for orchestra. The title, *Mercurial*, serves to not only describe what I wish for the piece to represent but also the manner in which it was composed. This project represents the ever changing nature of everything and the idea that although everything is subject to constant and often unpredictable change, things can still maintain a recognizable identity. Much of the composition is based around the manipulation and juxtaposition of a hadful of musical fragments, showing the potential of a concise set of materials to be expressed in a multitude of ways. These expressions are marked often by a sudden shift in mood, achieved through the utilization of vast orchestral forces. With this piece, I want to provide the listener with a musical experience that is both compelling and accessible -- stark in its unique treatment of musical elements but still rooted in the familiar practices of the past.

Recommended Citation:
Cantu, Esai; Dousa, Dominic. "Mercurial" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1089

Vocal timbre and color terminology in the female voice

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There is a variety of terms that voice teachers use to describe vocal timbres and registrational events in the female voice. These terms originate from metaphors, technical terminology, sensations and anatomical functions. Often, timbre and registration terms are used interchangeably and concurrently. This can vary from teacher to teacher and can be confusing for students who work with more than one teacher or director. It can be especially problematic for younger students who do not have much knowledge about the vocal mechanism. With a lack of defined terminology throughout the vocal pedagogy field, being able to devise and implement a unified set of terms locally can be a stepping stone to a useable terminology nationwide and in other areas of vocal pedagogy. A series of two surveys was sent out to voice teachers in the Texas, Oklahoma and New Mexico region. Participants were asked to describe the timbre and registrational events heard in various video clips. According to our results, registration and timbre terminology were often used both interchangeably and simultaneously to describe the voice. As a result, this study suggests that having a limited vocabulary for timbre may be too vague and ineffective due to the fact that there are many adjectives which can be used to describe the many colors of timbre among voices. However, for terminology regarding registrational events, a uniform and concise vocabulary may be extremely useful because the same registrational events occur in all female voices, regardless of timbre.

Recommended Citation:
Fernandez, Jasmine; Cates, Blythe. "Vocal timbre and color terminology in the female voice" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1075

Daesh: A threat to cultural security

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Daesh, also known as the Islamic State, is a security threat at the local, regional, national and international levels. The terrorist organization has contributed to erratic degrees of instability and civil war in the Middle East and its extremists have murdered and persecuted religious minorities and innocent civilians. In addition to these atrocious acts, Salafi jihadists deliberately destroy and profit from the sale of art and antiquities. This paper will consider the ideological, financial, and propagandistic rationales for the destruction of acclaimed cultural heritage as well as examine responses by the international community to this ongoing cultural security crisis. These responses have largely focused on site documentation, import restrictions, digital reconstruction, public-awareness campaigns, and emergency training. Thus far, a coordinated international response that translates to meaningful action has not materialized. The research identifies a series of challenges to improve cultural security in the region, and provides policy recommendations to overcome them.

Funding Source: MERITUS

Recommended Citation:
Hurtado, Victor ; Van Puyvelde, Damien . "Daesh: A Threat to Cultural Security " (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1084

The experiences and perspectives of latinas in the U.S.

Tania P Mariscal Quintana, Stacey K Sowards

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Through a textual analysis of Rosie Molinary's Hijas Americanas (2007), Sandra Guzman's The New Latina's Bible (2011), and Sonia Sotomayor's My Beloved World (2013), it is argued that the memoirs of Latinas who live in the United States are relevant to modern society. According to the United States Census Bureau, the Hispanic population of the United States as of July 1, 2015, making people of Hispanic origin the nation's largest ethnic or racial minority; however, this population is often not well represented in the media, policies, education and the workforce. The authors and collaborators of these three books have experienced either acculturation or assimilation of the contemporary U.S. American culture. Consequently, cultural hybridity is unexceptional because their lives integrate aspects of both cultures, the inherited Latin@ culture and the one from the US. This research project aims to understand how modern Latinas are creating agency as both Americans and Latinas. Four overreaching research themes were identified among the three books. The first theme, obstacles, examines different problems that Latinas face through their lives, which were found in personal settings such as their families and professional setting such as their education and jobs. This theme includes the analysis of different issues such as sexism, racism, cultural assumptions by others, body image to name some. The second theme, two worlds, explores the bi-culturalism that is experienced in their lives and how it affects their relationships with others. Third, the modern Latina examines how these women are acting to create their identities as Americans, Latinas, and women. Finally, I explore the advisory style of the texts in which the authors share their memoirs as advice for younger Latinas.

Recommended Citation:
Mariscal Quintana, Tania; Sowards, Stacey. "The Experiences and Perspectives of Latinas in the U.S." (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1095

Developing PAVEMENT (Paratextual Verse in Early Modern English Texts)

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PAVEMENT, a new tool for the Digital Humanities, will collect the prefatory poetry found in books printed before 1700. In this pilot study, we have created entries for the poetry that appeared as the paratexts for Aemilia Lanyer's 1611 book of poetry, *Salve Deus*. We then examined every other book printed by the same team of booksellers, Valentine Simmes and Richard Bonian, who printed Lanyer's 1611 book. Then we inspected all the printed works that Valentine Simmes and Richard Bonian printed and analyzed the paratextual verses. After checking every printed work, we identified for any similar patrons for the printed works. After completing each task, we added our findings into an excel sheet where we can have a better observation. We then created a digital database and individual pages for the relevant poems on a website. In its current form, the site hosts a searchable archive of records and artifacts. This research shows that PAVEMENT offers viability and future scalability.

Funding Source: COURI

Recommended Citation:
Ordaz, Carmen; Fleck, Andrew. "Developing PAVEMENT (Paratextual Verse in Early Modern English Texts)" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1086

Mujeres sin fronteras: women of color as border crossers

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The purpose of this qualitative paper is to share with colleagues and students the stories of Latinas- who have made a difference in the political and educational sphere by advocating for the marginalized minorities in the U.S- Mexico Border. Through a Feminist and Critical Pedagogical lens, the purpose of this study is to engage public school students in dialogue about their personal thoughts, observations, and stories that impede their learning or progress due to fear of crossing unknown borders. The aim is for the development of a Critical Conscious Student.

Research questions that will guide this study are as follows: What social factors can impede border crossing for women of color along the U.S.- Mexican Borderlands? How do women of color in public spaces, such as public schools, become political educational border crossers for educational social justice? Through single case studies of personal interviews of Latinas' living or working in the U.S.-Mexico borderlands, this study provides examples of the struggles and achievement the women in the study acquired and surpassed in their quest to fight social injustices as well as, how they became Border Crossers or *Mujeres sin Fronteras.* Their stories provide biographical or autobiographical sketches of success for the creation of unit plan lessons of borderland literacies to be implemented in local area schools.

Recommended Citation:
Ortiz, Jessica; Reza-Lopez, Elva. "Mujeres sin fronteras: women of color as border crossers" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1096

Creation of a virtual theatrical simulator for stage managers

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In the Stage Management course at the University of Texas at El Paso, having student stage managers practice the art of cue calling in class would be ideal through a virtual simulator. This would allow students to gain experience and practice before entering an actual theater space. A stage manager in the theatre has the primary responsibility of running a show every night, which involves calling cues. Calling cues to keep the technical aspect of the show going is essential, but difficult to do for new stage managers. Therefore, the solution to ease this stress could be found in a computer program that simulates a real theatre production. The research being conducted in building and designing a virtual simulator will determine if this type of technology could aid stage managers in the classroom, as well as in the real world setting.

Funding Source: VPSA On-Campus Student Employment Opportunity Program

Recommended Citation:
Rodarte, Mayra; Hill, Janet; Reyes, Yahaira; Gordillo, Orlando; Cubit-Tsutsui, Carolyn. "Creation of a virtual theatrical simulator for stage managers" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 989

SOCIAL SCIENCES

Measuring grammaticality in English and Spanish preschool-aged children

Stephanie N Escobar^, Vanessa Smith*, Connie Summers*

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Younger children who present with early signs of language impairment produce a lower proportion of grammatical utterances than their same-aged peers. Studies show that measures of grammaticality help distinguish language impairment in preschool and school-aged children. The most noted types of morphosyntactic deficits for children with language impairment are verb tense makers, argument omissions, pronoun errors, and other grammatical errors. Percent Grammatical Utterances (PGU) was used for the current study since it is a broad measure that incorporates a variety of properties that can account for grammaticality. There was a total of 19 participants, eight pre-school, six pre-kinder, and five kindergartener children in the study. Language samples were collected by asking the participants to describe 7 pictures in the elicited language, Spanish or English. Participants selected pictures at random and they responded based on four prompts. The language samples were recorded and later transcribed to analyze and code for the different types of grammatical errors. Out of 19 participants 14 provided an English sample, and 7 participants provided a Spanish sample. Only 4 participants were able to provide both an English and a Spanish language sample. Language samples were collected in both languages but stopped if a child would not provide any feedback in the elicited language to reduce frustration. Preliminary results indicated that children were less grammatical in Spanish than in English language samples. Spanish language samples had more grammatical errors in fragments, argument errors, along with other syntax, and semantic errors.

Recommended Citation:
Escobar, Stephanie ; Smith, Vanessa; Summers, Connie. "Measuring Grammaticality in English and Spanish Preschool-Aged Children " (2017).
COURI Symposium Abstracts, Spring 2017, ID= 999

An engaging partnership between high school students and scientists

Paola M Gama[1], Pei-Ling Hsu[2]*

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Research suggests that working with scientists provides students with many benefits to enhance their science learning. However, research also reported that negative confrontations between scientists and students could occur and lead to students' resistances in science. In this case study, we demonstrate how an exemplary scientist drew on the pedagogical tool of cogenerative dialogue to engage with students in ways that created a safe and welcoming environment for students to enrich their science knowledge, experience as well as their love for the field. Ethnographic data was analyzed for this study, including pre and post interviews; field notes, videos and pictures, as well as taking into consideration artifacts collected throughout the internship. Our analysis identified four strategies the scientist used in cogens to engage efficiently with students: (1) listen to students' concerns and care about students' well-being; (2) identify students' strengths to boost student's self-esteem; (3) take students' ideas into consideration for developing scientific projects; and (4) provide constant feedback to students' performance. These four strategies help the scientist to create a family-like environment where students enjoyed the experience, felt more confident in asking questions, giving feedback to peers as well as superiors, and engaged in the internship. This study provides insights that may help school teachers and counselors to consolidate their relationship with students, in order to create a family like classroom environment in which the students are engaged in their learning.

Funding Source: National Science Foundation

Recommended Citation:
Gama, Paola; Hsu, Pei-Ling. "An engaging partnership between high school students and scientists" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 978

Enhance a student-scientist partnership through a collaborative approach with cogenerative dialogues

Valeria G Gonzalez, Pei-Ling Hsu*

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Working with scientists has been suggested by researchers as an effective way to help high school students learn science more authentically. However, the student-scientist partnership also involves several challenges, such as communication barriers, time management, scientist availability, etc. The purpose of this ethnographic study is to demonstrate an exemplary student- scientist partnership and identify the factors that can enhance the partnership between the scientist and high school students. The data sources include real time video recording, field notes, interviews collected from a 7-month internship program titled Work With A Scientist Program. Our analysis identifies two major factors that contributes to the successful student-scientist partnership. First, the scientist used a collaborative approach to supervise high school students' science learning. The scientist organizes a collaborative team, including undergraduate, graduate students, post-doctoral members, and scientists from other laboratories to supervise high school students' scientific projects. This collaborative team helped the scientist to cover all aspects of the partnership with the high school students, such as time management, supervision, better communication, engagements, and project managements. Second, the scientist used a pedagogical tool called Cogenerative Dialogues to listen to students and address any issues with students together as a team. During the cogenerative dialogues, students and all the science professionals had equal opportunities to speak up and aim to improve science teaching and learning in the internship. As a result, the collaborative team and cogenerative dialogues helped the scientist to overcome challenges and create a successful internship for high school students.

Recommended Citation:
Gonzalez, Valeria; Hsu, Pei-Ling . "Enhance a student-scientist partnership through a collaborative approach with cogenerative dialogues" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 979

When does mentoring matter? The associations between research mentoring and academic aspirations

Charlene Holguin[1^], Miriam J Alvarez[1], Guadalupe Corral [2*], Sara E Grineski[3], Stephen B Aley [4], Osvaldo F Morera [1], Thomas Boland [5], Lourdes E Echegoyen [6], Marc B Cox [4], Timothy W Collins [3]

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[6] *COURI , The University of Texas at El Paso.*

Mentoring has been shown to increase students' ability to conduct research related activities like collect and analyze survey data, interpret results, and collaborate in a team to meet a goal. Skills acquired from undergraduate mentored research can influence students' preparation for future enrollment in advanced degrees. This study investigates the relationship between mentoring and research-related skills. We hypothesized that mentor skills and the quality of the mentor-mentee relationship are positively associated with mentees' skills, confidence, and likelihood of pursuing an advanced degree. Participants were BUILDing SCHOLARS (N=15) who had participated in the 2015-2016 Mentored Research Program. The Mentoring Competency Assessment was used to evaluate mentor-mentee relationships. Items from the Undergraduate Research Student Self-Assessment regarding skills and likelihood of pursuing an advanced degree were utilized as outcome measures. Zero-order correlations were conducted to test our hypothesis.
Results: Students indicated being more likely to enroll in PhD or master's programs in science and mathematics or engineering as a result of mentored research experiences. Results revealed no significant correlations between mentoring competence (skills and relationship) with the mentee's skills, confidence, and likelihood of pursuing an advanced degree. However, mentee's skills were positively correlated with confidence ($r=0.65$, $p=0.01$) and confidence was positively correlated with the likelihood of pursuing an advanced degree ($r=0.57$, $p=0.03$). Mentored research activities can have a positive influence on students' preparation, research skills and future aspirations. Contrary to our predictions, our results suggest that self-confidence and skills are stronger predictors of likelihood of pursuing an advanced degree

Funding Source: National Institute of Health

Recommended Citation:
Holguin, Charlene ; Alvarez, Miriam; Corral , Guadalupe ; Grineski, Sara ; Aley , Stephen ; Morera , Osvaldo ; Boland , Thomas ; Echegoyen , Lourdes; Cox , Marc ; Collins , Timothy . "When does mentoring matter? The associations between research mentoring and academic aspirations" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1093

Preparing versatile and confident professionals through participation in the Training in Environmental Research and Academic Success (TIERA) program

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Preparing students for research and applied experiences in STEM fields impacts students' attitudes and career prospects. Previous research suggests that research experiences increase student confidence as a researcher, their educational performance, and an interest in pursuing post-graduate studies and careers in STEM fields. The Training in Environmental Research and Academic Success (TIERA) program prepares students for research and applied environmental sector jobs. TIERA is a new program so its impact on students' post-graduation plans is understudied. We hypothesized that students who score highly on the environmental knowledge assessment, report greater confidence in their environmental research skills, and report greater preparedness will be more likely to indicate graduate school as a post-graduation plan as opposed to immediate employment in the applied sector. Senior seminar exit surveys were administered to environmental science students in the fall semesters of 2014-2016. There were no significant correlations between environmental knowledge assessment scores and students' level of confidence and preparedness. Additionally, confidence and preparedness did not significantly correlate with post-graduation plans. There were ceiling effects where most students reported high levels of confidence and preparedness. These results suggest that TIERA prepares students who are highly confident and prepared for post-graduate plans, and that these students are equally likely to pursue graduate school or employment in an environmental science position. In conclusion, research programs such as TIERA are contributing to the formation of confident and prepared individuals interested in multiple career options.

Funding Source: Department of Education

Recommended Citation:
Lopez, Andrea; Corral, Guadalupe; Heydarian, Nazanin; Walsh, Elizabeth; Lougheed, Vanessa; Jin, Lixin; Doser, Diane. "Preparing versatile and confident professionals through participation in the Training in Environmental Research and Academic Success (TIERA) program" (2017).
COURI Symposium Abstracts, Spring 2017, ID= 1022

Doctor, doctor, give me the news: generalists versus specialists in the infertility diagnostic process

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The literature on patient satisfaction is wide, yet there is less in regards to the difference between generalists and specialists, and no literature to our knowledge on the difference between generalists (OB/GYNs) and specialists (Reproductive Endocrinologists) in regards to patient satisfaction with infertility diagnosis. Providing insight into the diagnostic process is helpful for patients, who are already going through a very stressful experience, and for health professionals to ensure better patient satisfaction. We utilize interview data from 20 women and 8 men who underwent fertility treatment between 2002-2008. Our data reveal that both generalists and specialists dismissed respondent's "lay" knowledge concerning their own bodies. However, generalists tended to view the female body as more "normal," (unless women were older in age), and thus did not pursue diagnostic testing as quickly as specialists. This frustrated the women who were unable to get pregnant quickly and eventually pursued treatment from specialists. Thus, for these patients, satisfaction was evaluated almost solely in terms of *outcome* (i.e. pregnancy). This raises questions of whether physicians are relaying accurate information on success rates of infertility treatments, and if not, why?

Recommended Citation:
Mahmoud, Sara; Leyser-Whalen , Ophra. "Doctor, doctor, give me the news: generalists versus specialists in the infertility diagnostic process" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1004

Cultural barriers Hispanic youth face with Human Papillomavirus (HPV) vaccine adherence

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The goal of this current study is to examine human papillomavirus (HPV) vaccine adherence in a primarily Hispanic community. There are various reasons why Hispanic youth may not receive the vaccine (e.g., barriers such as time, insurance coverage, or education). There are also cultural factors that are important to understanding the high rates of HPV in this particular community (e.g., patient-practitioner communication barriers and the source of HPV and HPV vaccine information), which will be further examined in the present study. Approximately 220 participants will be recruited from the University of Texas at El Paso to complete a survey that assesses attitudes, perceptions, and experiences related to the HPV vaccination. Results from this study will provide insight into cultural factors that impact decisions related to the HPV vaccine. Findings will be disseminated to healthcare practitioners and community stakeholders to increase HPV vaccination knowledge and adherence in this region. Future research is needed to investigate the impact of cultural values and social stigma on HPV vaccination adherence.

Funding Source: BUILDing SCHOLARS

Recommended Citation:
Mendoza, Gabrielle; Frietze, Gabriel; Shenberger-Trujillo, Jessica. "Cultural barriers Hispanic youth face with Human Papillomavirus (HPV) vaccine adherence" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1010

Life Course and Ecology of Homelessness

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The city of El Paso is a city with a diverse population such as the military, mentally ill, single women, and the elderly as a part of our community that is or has been homeless at some point in their lives (Bruenig, 2013). The research on Life course and Ecology of Chronic Homelessness intends to answer what factors contribute to the cycle of chronic homelessness among the El Paso community. By answering the proposed research question of what factors mainly contribute to the endless cycle of chronic homelessness, we hope to inform and educate the general public, contribute to a Southwestern homeless shelter to possibly obtain grants and funding based on the data, and raise awareness on homelessness occurring here in El Paso. Additionally, we seek to be able to advocate for oppressed individuals who are and have been homeless. The data collection was obtained through qualitative interviews. A total of 40 homeless residents of the shelter were interviewed, as well as 40 staff members. Preliminary data analyses indicate a lack of resources for individuals who suffer from a mental illness. Also, preliminary results have shown that in most cases an unexpected family event such as divorce, lost of employment, housing or family crisis such as violence tends to leave individuals homeless. Homelessness can happen to any individual; homelessness has no specific target since any individual can be a paycheck or unfortunate event away from becoming homeless.

Funding Source: COURI

Recommended Citation:
Morales, Jessica; Paat, Yok-Fong. "Life Course and Ecology of Homelessness" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1031

Graphic Anthropology: The Re-integration of Drawing in the Anthropological Toolkit

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The use of drawings in archaeology has been a common practice. However, this method has not been so commonly used in ethnographic research. Drawings as a form of illustrating patterns of everyday life provide a visual way of thinking. Illustrations can serve as a means to record observations and inscribe memory as an embodied practice of cultural conventions. The sensory experiences provided by drawing illustrations and graphics can yield corporeal and vivid images. By capturing sensory experiences gained in the field, this research documents images of U.S.-Mexico border as a rich space of cultural heritage where the exchanges of traditions creates diverse ethnic and national identities with an emphasizes on the importance of graphics as part of the anthropological tool kit.

Funding Source: Dodson Founds, COURI MERITUS

Recommended Citation:
Pablos, Daniella; Nuñez-Mchiri , Guillermina. "Graphic Anthropology: The Re-integration of Drawing in the Anthropological Toolkit" (2017).
COURI Symposium Abstracts, Spring 2017, ID= 1092

Story Telling by An Exemplary Scientist to Engage High School Students in Scientific Practice

Vania V Ochoa, Pei-Ling Hsu

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Involving students to work with scientists has been suggested by researchers as an effective way to help students learn science more authentically. However, since scientists are usefully deemed as characters with higher power, status, and knowledge, students may feel nervous or intimidated, especially when scientists speak jargons and complex language. The purpose of this ethnographic study is to demonstrate how an exemplary scientist could communicate effectively with students through story telling. Nine high school students in our study worked with a scientist and her research team for seven months and conducted scientific projects based on their interest. The data sources for this study include real time video recording, field notes, pictures, and artifacts used by participants. Drawing on thematic analysis, we identified nine different types of story telling the scientist used to engage students in science. The purposes of these stories are to help students to *ask more questions*, *conduct scientific practice thoroughly*, *take scientific notes, improve communication, willing to brainstorm ideas without hesitation, understand the advantages of being a scientist, present scientific findings, not being afraid of making mistakes,* and *to pursue careers based on one's passion*. Our study concluded that these stories help the scientist to convey the value, importance, knowledge, and skills of scientific practice seamlessly in a non-intimidating, friendly, and comprehensive manner. As a result, students were able to work with the scientist closely without barriers. These stories may also serve as pedagogical tools to help educators to teach science more efficiently in educational settings.

Funding Source: National Science Foundation

Recommended Citation:
Ochoa, Vania; Hsu, Pei-Ling. "Story Telling by An Exemplary Scientist to Engage High School Students in Scientific Practice " (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 983

The locus of language selection on bilingual reading comprehension

Karla Tarin, Ana I Schwartz*

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Students in U.S schools who speak English as a second language have a higher risk of academic failure which has been linked to reading comprehension. The present study sought to identify the mechanism that allow bilinguals to select the appropriate language during text comprehension. In the bilingual literature, a critical limitation that is present in studies investigating the influence of context on cross-language competition is the utilization of single words or single sentences as stimuli. Because this might not be reflective of authentic texts, this study presented participants with stimuli in the form of paragraphs (3 sentences). Sixty Spanish-English bilingual college students read a series of English paragraphs while their eye movements were recorded. This study considered both the participant's processing time of target words within the paragraphs and accuracy scores from reading comprehension evaluations as dependent measures of the following three factors: degree of context bias in the paragraphs towards the target word, target word cognate status; cognate (words with similar phonological form and meaning in two languages) vs non-cognate, and language proficiency of the participant (Spanish dominant, English dominant, or balanced bilingual). It is expected data will support the notion that the construction of a detailed semantic representation of a text will allow for activation to flow in a targeted way, precluding competition from the non-target language.

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Barriers to active aging in Costa Rica

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As life expectancy in Costa Rica increases and fertility decreases, the population aged 65 and over will increase over the next two decades. It is anticipated that the dependency ratio of seniors to working age individuals will create an increased need for health and social services for the elderly. Active aging refers to positive subjective physical, emotional, and psychological well- being. It entails taking an independent role in one's life throughout the aging process. This study focuses on finding barriers to active aging as well as factors that support active aging. To identify these factors, a case study method was utilized. Factors that limit active aging include 1) the ability to remember when prescription medication was taken, 2) limited social and financial support from family, 3) inadequate inter-personal interactions with family, friends, and community members, 4) environmental barriers and hazards that limit mobility such as uneven sidewalks, traffic and congestion in public spaces. Factors that support active aging include participation in a senior center where volunteers coordinate activities to stimulate physical and cognitive health. Based on the Healthy People 2020 guidelines, some recommendations include: accessible sidewalks, use of assistive devices to enhance mobility, teaching the importance of medication compliance, and arranging for regular communication with family members.

Funding Source: MHIRT, UTEP, Universidad de Costa Rica

Recommended Citation:
Trujillo Molina, Marisol; Lusk, Mark; Vargas Chaves, Shirley. "Barriers to active aging in Costa Rica" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1077

Transform Students' Learning Motivation from Extrinsic to Intrinsic Through Cogenerative Dialogues

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Internships have been suggested as an effective way to help students learn real world practices. However, simply exposing students to sequences of mentors' actions does not guarantee that students would actively participate in projects or mentors will have an impact on students' attitudes and behaviors. This study introduces cogenerative dialogues as a pedagogical tool to enhance the communications between students and engineers in a university internship environment. The purpose of this ethnographic study is to understand how cogenerative dialogues may help high school students to actively engage in open inquiry projects with their mentors. In this study, high school student interns worked with engineers for 7 months and were invited to conduct cogenerative dialogues with engineers regularly and discuss any issues, concerns and positives happened in the internship in order to improve their learning experience. The data sources include real time video recordings, field notes, students' journals, and individual interviews. Using self-determination theory as a guiding framework, our analysis suggests that during cogenerative dialogues, students would brainstorm various ideas to address engagement issues, interpersonal relationship problems, stress, and procrastination. As a result, cogenerative dialogues help students to understand the importance of work ethics, team work, communications, and time management in order to achieve a successful collaboration and so transform their learning motivation from extrinsic to intrinsic. Our findings conclude that cogenerative dialogues can help students to reflect on their learning process, exchange their ideas with their peers and mentors, and empower them to develop a sense of autonomy and responsibility

Funding Source: National Science Foundation (NSF)

Recommended Citation:
Urquidi, Yamile; Hsu, Pei-Ling . "Transform Students' Learning Motivation from Extrinsic to Intrinsic Through Cogenerative Dialogues " (2017).
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APPLIED SCIENCES

Pump-probe spectroscopic studies of surface plasmon resonance of gold nanorods

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Current optical microscopic techniques have widely utilized fluorescence of molecules to observe biomolecular and cellular processes in the nanosecond time scale. Femtosecond (10^{-15} s) laser spectroscopy allows us to study ultrafast dynamics in molecular systems. In this work a pump-probe method which does not rely on the fluorescence of the material is being developed for super-resolved optical microscopy to study the surface plasmon resonance (SPR) of gold nanorods for future biomedical imaging. Two femtosecond pump laser beams at 510 nm, one with Gaussian mode and the other with donut mode, are modulated and used to pump the gold nanorods sample. A probe laser beam with Gaussian mode at 820 nm detects the sample after excitation from pump beams, and subsequently becomes modulated due to SPR of gold nanorods. By observing the slight modulation of the probe beam we can study the ultrafast electron and phonon dynamics in gold nanorods.

Recommended Citation:
Aguilar, Angela ; Ding, Yu; Li, Chunqiang. "Pump-probe spectroscopic studies of surface plasmon resonance of gold nanorods" (2017).
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Home-free community needs assessment within the Paso Del Norte Region

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The Paso Del Norte region serves a unique population that blends diverse cultures, beliefs, and groups originating from El Paso, Texas; Las Cruces, New Mexico; and Ciudad Juarez, Mexico. The unique population of the Paso Del Norte region harvests a unique combination of needs and obstacles encountered, including immigration status, negative stigmas, lack of education, and lack of access to basic needs, especially for those within the home-free subgroup. The El Paso Coalition for the Homeless estimates approximately 1400 men, women, and children are homeless within the El Paso region alone. Preliminary interviews were conducted for three nonprofit organizations whose mission statement aligns with increasing access to basic necessities and improving the quality of life for different population subgroups. Interviews assisted in identifying strong needs currently present within the home-free population. Needs were categorized into three areas: basic necessities, health care, and program management. These categories were determined based upon information collected through follow up interviews and assessment of The Opportunity Center of El Paso for the Homeless. The goal of this project is to identify underlying issues that lead to a decrease in access to basic needs and quality of life for the home-free population of El Paso. Future studies are directed towards developing tools, using methods and principles of engineering design, that will assist in delivering basic needs and improving the quality of life for the homeless of the Paso Del Norte region serviced through the Opportunity Center of El Paso.

Funding Source: NIH

Recommended Citation:
Alvarado, Daisy; Kendall, Meagan. "Home-free community needs assessment within the Paso Del Norte Region" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1034

Generating pairwise-covering test suites for problems with uneven numbers of parameters' values

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Technology has become an essential part of our society. We rely so much on software that failure has the potential to be catastrophic. For instance, between 1985 and 1987, Therac-25 was responsible for at least 6 fatalities of cancer patients being wrongly administered massive overdoses of radiation. Such catastrophes could have been avoided if thorough testing had been enforced. However, companies wanting to save money and time can lead to overlook errors. Additionally, in many cases too, it is just impractical to thoroughly test software, just because the amount of possible configurations is too large. Nevertheless practical and thorough-as-possible testing needs to be conducted. Empirical studies have shown that most errors in a software result from the interaction of a limited number of its parameters. As a matter of fact, the study found, for instance, that 80% of bugs could be found by solely focusing on two-parameter interactions. This is great news because it offers an opportunity for quality testing at a potentially much lower cost. However, it opens the door to many challenges in trying to actually cut the testing costs as much as possible, i.e., in generating test suites as small as possible. In this work, we worked on designing strategies to generate test suites as small as possible that cover only, but all, two-parameter interactions. Specifically, we did that for the case when software to be tested has parameters that take different numbers of values. We implemented our algorithms and show experimental results. Future work includes testing our strategies for larger problems (i.e., larger number of parameters and values per parameter).

Funding Source: COURI

Recommended Citation:
Ayub, Cristian; Zamudio Arias, Miguel; Ceberio, Martine. "Generating pairwise-covering test suites for problems with uneven numbers of parameters' values" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1009

Design and synthesis of fullerene-based metal-organic frameworks

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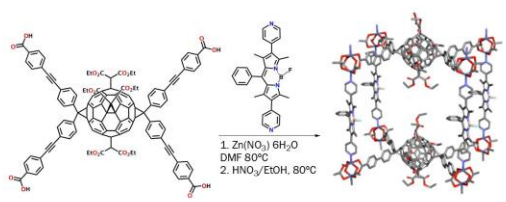
As the cost of oil and the damage done to the atmosphere increase, new sources of energy have been sought. One of the most promising sources of energy is hydrogen. This simple compound, H_2, has caught the attention of researchers as it is abundant and the harvest of energy is possible and efficient. In order to use hydrogen gas as a viable source of energy for everyday applications, an effective method for storing this gas has to be developed since current storage methods are impractical and ineffective.[1]Metal Organic Frameworks (MOFs) have shown promising results as as hydrogen storage materials. The synthetic flexibility, high stability and hydrogen storage properties of fullerenes makes them ideal candidates for their use as linkers in MOFs. Our design was guided by previously reported fullerene-free MOFs that exhibit efficient hydrogen storage capabilities.[2] We report the synthesis of tetra-COOH fullerene derivative for its use in the construction of fullerene based MOFs for use in hydrogen storage.



Funding Source: The Welch Foundation, National Science Foundation

Recommended Citation:
Betancourt, German; Echegoyen, Dr. Luis; Suarez, Catalina; Echegoyen, Luis. "Design and synthesis of fullerene-based metal-organic frameworks" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1026

English and Spanish language sample measures in bilingual preschool children

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Language sample analysis is a valuable method when evaluating oral language abilities in children to determine if a language disorder is present. Research has validated the use of language samples with monolingual children, but there is still uncertainty and needed validation of effective diagnostic tools in bilingual children. This current study sought to analyze language skills in bilingual preschool children using a picture elicitation task. Nineteen children between the ages of 3 and 5 participated in the study. Children were shown 7 pictures and asked to describe what was happening in each picture using 4 prompts. These language samples were transcribed using the Systematic Analysis of Language Sample Transcripts Software (SALT). The transcriptions were then analyzed in SALT to obtain 3 language sample measures in English and Spanish. Mean length of utterance (MLU) is a measure of syntactic complexity that is central to identifying a language disorder in young children. Number of different words (NDW) is an indicator of lexical diversity for semantic measures. Mazes are filled pauses, false starts, repetitions, and reformulations in running speech that can indicate word-finding difficulties. Initial findings showed that MLU was higher in English than in Spanish, meaning they were producing longer utterances. Despite the longer utterances, children did not produce more mazes in English. Mazing was similar across the two languages. These results provide evidence for increased confidence in the use of language sample measures when analyzing bilingual preschool children and can contribute to improved accuracy in diagnosing language disorder for bilingual children.

Funding Source: None

Recommended Citation:
Cano , Isabel ; Garcia, Adriana; Summers , Connie ; Smith , Vannessa. "English and Spanish Language Sample Measures in Bilingual Preschool Children " (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1000

CAD tool for 3D circuit layout and signal routing

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In many cases, tremendous benefits could be gained by producing 3D circuits instead of conventional 2D planar circuits. In a true 3D circuit, components can be located at any position and can be oriented at any angle. This will provide additional degrees of freedom to minimize and match trace lengths, making circuits smaller, more efficient, and support higher bandwidth. Electrical interconnects will meander smoothly throughout the circuit following spline-like paths decreasing parasitic impedances. However, no CAD tool exists that is able to design these 3D circuits hindering the research into these devices. The EM Lab has created a tool that is capable of designing basic 3D circuits. Its functionalities include importing information from schematic capture software such as component geometries and lists of interconnects, refining and forming 3D models of electronic components, orienting and arranging these components in 3D space, and drawing and routing interconnects between components. Using this tool, the EM Lab has created a conceptual model of a basic 555 timer circuit that flashes an LED. Future work will include incorporating various types of high-frequency transmission lines as interconnects, incorporating metamaterial concepts, automated placement and routing, utilizing electromagnetic simulations to optimize circuits, and file exporting to be used for 3D printing.

Funding Source: COURI

Recommended Citation:
Carranza, Gilbert; Gutierrez, Jesus; Rumpf, Raymond. "CAD tool for 3D circuit layout and signal routing" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1047

Characterization of the pyroelectric coefficient of a high temperature sensor

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Temperature is one of the most important thermodynamic properties measured and controlled in energy generation systems. To operate energy systems at optimum conditions for lower emission and higher efficiency, it is important to measure real-time temperatures. Furthermore, temperature sensing in intense environments is necessary because most sensors in energy systems get exposed to elevated temperatures, corrosive environments, and elevated pressures. One of the solutions for developing harsh environment sensors is to use ceramic materials, specifically functional ceramics such as pyroelectrics. Pyroelectric ceramics can be used to develop active sensors for both temperature and pressure due to their capabilities in coupling energy among mechanical, thermal, and electrical domains. In this study, Lithium niobate (LiNbO3) pyroelectric ceramic material was used to develop a temperature sensor to measure temperatures up to 500°C. LiNbO3 has high Curie temperature (1210°C), which makes it promising to be used as sensing material for high temperature applications. Due to the non-linear pyroelectric response of LiNbO3, the temperature-dependent pyroelectric coefficient of LiNbO3 was measured with a dynamic technique in temperature ranges of up to 500°C. This pyroelectric coefficient of LiNbO3 was found to increase from -8.5x10 - 5 C/m2°C to -23.70x10 - 5 C/m2°C from room temperature to 500°C. The LiNbO3 sensor was then tested for higher temperature sensing at 220°C, 280°C, 410°C, and 500°C and has shown 4.31%, 2.1%, 0.4%, and 0.6% deviation respectively, compared with thermocouple measurements.

Funding Source: U.S. Department of Energy, NSF-PREM

Recommended Citation:
Castañeda, Mariana; Sarker, Md Rashedul; Silva, Jorge; Wilburn, Bethany; Love, Norman; Lin, Yirong. "Characterization of the pyroelectric coefficient of a high temperature sensor" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 980

Evaluating the implementation of the culturally adequate birth in the Hospital of Pelileo, Ecuador from June to July 2016

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Introduction: This research evaluated the implementation of the culturally adequate birth (CAB) within the medical services offered in the regional hospital of Pelileo, Ecuador. Despite the high demand for the cultural technique and that the hospital had the equipped necessary to implement this technique; few procedures had been performed at the hospital. **Objective:** To assess the underlying reasons for the lack of CABs in the Hospital. **Methods:** Observational descriptive, Cross-sectional research survey study, with quantitative methods. The surveys consisted of 2 sets of surveys with about 15 multiple-choice. The surveys were administered to medical staff, pregnant women, as well as, those recovering in post-partum, during the months of June and July 2016. **Results:** 65.4 % of the medical personnel considered that the implementation would improve access to healthcare, yet 58.8 % of the women that were interviewed reported that they were never informed about the CAB. 78.6% of the women said they wanted to be able to choose the position to give birth and 90% of women wanted to be accompanied by a family member while giving birth. **Conclusion:** Lack of education and training of the CAB had caused a decline in the performance of the CAB in the Hospital. Future investigators need to make sure the medical personnel are well trained in this technique. Future researchers will need to conduct a more rigorous research to see if the maternal and neonatal mortality rates will decrease in the area because of the implementation of this technique.

Funding Source: National Institute on Minority Health & Health Disparities (NIMHD), part of the National Institute

Recommended Citation:
Cervantes, Norma; Perez, Rebecca; Hernandez, Edith; Villacis, Marina; Miranda, Octavio. "Evaluating the implementation of the culturally adequate birth in the Hospital of Pelileo, Ecuador from June to July 2016" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 991

Characterization Of β-cell behavior in alginate/gelatin hydrogels

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Type 1 diabetes patients lack the ability to produce insulin which is an essential hormone for the reduction of glucose levels in the bloodstream. The most common treatments for type 1 diabetes patients are the constant administration of insulin shots, pancreatic transplantation and islet transplantation. The major obstacles of islet transplantation are the elicited immune response of the host, which tends to encapsulate the islet transplants with fibrous tissue over a period of months, rendering the treatment ineffective. We are characterizing β-cell behavior in alginate and alginate/gelatin gels, because β-cells behavior in islet transplantation will give valuable insight in the improvement of islet transplantation and minimizing host immune response. We will present β-TC-6 (ATCC CRL-11506) cell characterization in 2% alginate with 0%, 5%, 10%, 15% and 16% gelatin hydrogels using confocal microscopy, proliferation, migration and viability assays. These results reveal that β-cell behavior depends on hydrogel composition, resulting in a difference of proliferation rate and spheroid morphology as well as size. In future work we will transplant the hydrogels into SCID mice to characterize the immune response in host tissue and optimize hydrogel composition.

Funding Source: National Institutes of Health

Recommended Citation:
Chavarria, Daniel; Solis, Luis; Boland, Thomas. "Characterization Of -cell behavior in alginate/gelatin hydrogels" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1041

Cotton-carbon nanotubes composites for water sanitation and food safety

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Food-safety and -preservation are priority areas of the US Department of Agriculture that require innovations in water sanitation. Recent bacterial outbreaks in agriculture were shown to be a consequence of exposure to contaminated water sources during storage and transportation. To address this problem, we are designing a device that utilizes cotton-carbon nanotubes composites to convert oxygen in air into antimicrobial peroxides in low concentration and will sanitize water. The device can both sanitize large quantities of water in short periods of time, as well as produce water mists carrying safe quantities of antimicrobial peroxides for applications in food-safety and -preservation. The cotton-CNT composite was produced by formation of phenyl esters on the surface of cellulose, followed by mixing with CNT. This device will be effective, long-lasting and self-sufficient, working with a simple circuit that consist of a solar cell, an electroplate and a battery, and contribute to prevent future bacterial outbreaks in the agricultural industry.

Funding Source: USDA

Recommended Citation:
Chavez, Carmen; Ramirez, Paulette; Melendez, Josh; Noveron, Juan; Rosales, Nicholas; Barrera, Luis ; Noveron, Juan. "Cotton-carbon nanotubes composites for water sanitation and food safety " (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1044

Identification of Risk Factors of Falls Among Community-Dwelling Older Adults in Los Guido de Desamparados, Costa Rica

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Falls are a serious challenge among older adults worldwide. Given the fact that the elderly population and their life expectancy is rapidly increasing, it is pressing to design effective fall prevention programs for this population. The first and perhaps the most important step towards the development of fall prevention interventions could be the identification of risk factors of falls. Although previous studies have proposed various fall risk factors, the risk factors could be region-related. The purpose of this study was to identify the risk factors of falls among older adults in Los Guido de Desamparados, a rural region in Costa Rica. One hundred and one older adults (mean age: 70±5 years) from this region participated in the study. Two instruments were adopted to collect sociodemographic, vision, auditory, gastrointestinal, musculoskeletal, circulatory, urinary, physical activity, alcohol use, medicine use, and environmental variables. Among all participants, 42.6% experienced at least a fall in the past year. Based on their fall history, participants were divided into either the fall or non-fall groups. Fallers were more likely to have reported walking limitations (67.4% in the fall group vs. 34.5% in non-fall group, p=.001) dizziness (60.5% vs. 39.7%, p=.039), and urinary incontinence (53.5% vs. 32.8%, p=.037). However, other variables were not significantly different between groups ($p > 0.05$ for all). By identifying walking limitations, dizziness, and urinary incontinence as specific risk factors this study could provide guidance when developing fall prevention programs aiming at older adults in Los Guido de Desamparados region.

Funding Source: National Institute on Minority Health and Health Disparities

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Recommended Citation:
De La Pena, Catalina; Ibarra-Mejia, Gabriel ; Wittenberg, Cynthia; Lau Sanchez, Norma . "Identification of Risk Factors of Falls Among Community-Dwelling Older Adults in Los Guido de Desamparados, Costa Rica" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1002

Design and characterization of passive, wireless temperature sensors based on metamaterial structures for harsh environment applications

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The development of wireless sensing technologies capable of withstanding harsh environments has acquired significant attention due to the current need of precise monitoring in energy conversion systems. An accurate temperature monitoring of the processing parameters is of utter importance in order to achieve higher thermal efficiencies, and consequently lower the cost of operation and the amount of pollutants released into the atmosphere. The proposed sensor is based on the metamaterial concept consisting of a Closed Rings Resonators (CRRs) structure embedded in a dielectric substrate. The dielectric matrix used was a mixture of 70 vol% Boron Nitride (BN) and 30 vol% Barium Titanate (BTO), and commercially available cupper washers were used as the CCRs. The response of the sensor was simulated using Ansoft's ANSYS HFSS in a frequency range of 7-16 GHz. This simulation was used to determine the optimal ratio between BN and BTO, and which ring geometry would provide the highest sensitivity possible. After the simulations were completed, the sensor was fabricated using a traditional powder compression method. Free space testing was carried out using a Vector Network Analyzer (VNA) and two Gaussian Beam Antennas. The experiments were performed from room temperature up to 200°C where the sensor showed a sensitivity of 0.4MHz/°C. The resonance frequency of the sensor was 11.93 GHz at room temperature, and it decreased to
11.85 GHz at 200ºC.

Funding Source: UTEP Vice President for Student Affairs and COURI

Recommended Citation:
Delfin, Luis; Karim, Hasanul; Chavez, Luis; Lin, Yirong. "Design and characterization of passive, wireless temperature sensors based on metamaterial structures for harsh environment applications" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1060

Understanding culture: Opportunities for healthcare practitioners to impact HPV immunization adherence

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The Human Papilloma Virus (HPV) is the most common sexually transmitted infection. A vaccine that prevents the HPV strains most likely to cause genital warts and cervical cancer is available for females and males. The vaccine comes in a three- dose series and is recommended for children ages 11-12. The CDC recommends that the HPV vaccination be received by age 26 (females) or 21 (males). The goal of the current study is to assess health disparities related to HPV vaccine adherence in a Hispanic-majority, underserved, border population. Approximately 220 participants will be recruited at the University of Texas at El Paso campus. Participants will be asked to complete a survey assessing knowledge, attitudes, and perceptions related to the HPV vaccine. Additionally, participants will be asked about their experiences discussing HPV and the HPV vaccine with their healthcare practitioner. The results of our study will document barriers to HPV vaccination adherence, and critical opportunities for intervention. Findings will be disseminated to healthcare providers and stakeholders in the community in order to impact practices related to HPV vaccinations.

Funding Source: National Institutes of Health (NIH)

Recommended Citation:
Fincham, Danielle; Shenberger-Trujillo, Jessica; Frietze , Gabriel. "Understanding culture: Opportunities for healthcare practitioners to impact HPV immunization adherence" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 988

Cobalt-molybdenum sulfide nanocrystals on carbon alleotropes for next generation of anodes in lithium ion batteries with increased charge capacity

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Increased global demand for batteries has been of great interest recently due to the popularity of clean energy sources, such as solar and wind power, along with electric vehicles. As a result, we focus our research efforts on increasing the charge capacity of rechargeable lithium ion batteries while increasing battery life. In particular, contrary to focusing on the cathode, we focus on new anode material. MoS2 and CoS2 induce lattice deformities in graphene sheets which in turn produce higher lithium ion storage. We report the synthesis and characterization by XRPD, and SEM of these novel anode materials.

Funding Source: NSF

Recommended Citation:
Garcia, Jacobo; Dominguez, Noemi; Norveron, Juan. "Cobalt-molybdenum sulfide nanocrystals on carbon alleotropes for next generation of anodes in lithium ion batteries with increased charge capacity" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1048

Super-hydrophobic and hard HfO2/Mo/HfO2 nano-devices for efficient energy utilization in buildings

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The ever increasing demand for sustainable energy calls upon practices for efficient energy utilization, management, and harvesting. Presently, buildings consume nearly half of the global energy and contribute to greenhouse gas emissions. In this work, a nano-layered, multilayered device (referred to heat resistant transparent (HRT) window) with controlled microstructure were demonstrated for efficient utilization of solar energy in buildings. HRT window, which is a glass coated with a Dielectric/Metal/Dielectric (D/M/D) stack, can potentially contribute to reducing CO_2 emissions and energy saving by the efficient reflection of the infrared (IR) and ultraviolet (UV) spectrum. In this project, a D/M/D multilayer structure comprising of Hafnium Dioxide-Molybdenum-Hafnium Dioxide (HfO_2/Mo/HfO_2) with 50 nm thick HfO_2 layers and 5-25 nm thick Mo interlayer were deposited over glass substrates using electron-beam physical vapor deposition (EB-PVD). Structural studies revealed that D/M/D with low thick Mo layer was amorphous, while the higher thickness of Mo initiates the amorphous-to-nanocrystalline transformation of D/M/D devices. A continuous increase in roughness is observed with increasing Mo thickness. The optical properties reveal that the devices with Mo thickness <20 nm exhibit a high transmittance (80-90 %) in the visible and infrared (IR) regions, whereas D/M/D film with 20 nm thick Mo layer shows the decent transmittance (62%) and reflectance (25%) for Vis and UV-IR spectrums. The microstructure of intermediate Mo layer and HfO_2-Mo interfaces significantly control the mechanical properties of D/M/D devices. The spectral response, hydrophobicity and mechanical response suggest a more feasible application of microstructure controlled HfO_2/Mo/HfO_2 devices in warm environments for energy-saving.

Funding Source: NSF PREM

Recommended Citation:
Grijalva, Cristian; Dubey, Paritosh; Gomez, Juan; Ramana, Chintalapalle. "Super-hydrophobic and hard HfO2/Mo/HfO2 nano-devices for efficient energy utilization in buildings" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1036

Test of statistical unmixing of sediment populations.

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A wide variety of statistical techniques has recently been introduced to sedimentary geology studies. One of these techniques is, End Member Mixing Analysis that has been used to differentiate environments and sediment sources within suites of sediments. End member mixing analysis works under assumptions that 1) different sources and the transporting of these create different sedimentary populations, these populations mix, and the presence of different sources can be identified. However, no testing has been done that tracks the sediment within to the inferred sources, demonstrating the mixing of different populations. This study is the first test of End Member Mixing that relates sediments mixing along a drainage to the tributaries that provided the sediment. The study was conducted in the Dona Ana Mountains of southern New Mexico. Thirty- two samples were collected from 3 tributaries of Lucero Arroyo. The samples were all collected from active arroyo floors and grain size distributions were similar, with mean sizes ranging from 0.5 mm to 1.5 mm. Four end members were recognized and matched to the samples collected. Therefore, End Member mixing can distinguish different sources, when the sediment properties are different. However, care must be taken not to over interpret results as sorting of sediment during deposition can create end members that reflect those processes and not sources.

Funding Source: AY-PREP, UTEP

Recommended Citation:
Guijarro, Carolina; Langford , Richard . "Test of statistical unmixing of sediment populations." (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1059

The numerical analysis of equivalent stress functions for multiaxial creep deformation, damage, and rupture

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The US coal-fired power generation fleet is aging with plants coming closer to the end of their service lives. The US Department of Energy (DOE) has instigated a service life extension program that could see power plants remain in operation for an additional 30 years of service. This extension plan necessitates a higher fidelity of constitutive models where the existing state of structural components is assessed and probabilistic constitutive models applied to predict the probability of remaining life. When a component is subjected to a long-term multiaxial state of stress the remaining life can be challenging to predict. Many equivalent stress functions have been introduced to predict the creep deformation, damage, and/or rupture as a function of the state of stress. There is a need to determine which of these models are "best" exhibiting both accuracy and conservatism in predictions. In this study, seven equivalent stress functions are integrated into a Sinh-hyperbolic creep damage constitutive model and compared. Multiaxial creep data for alloys including P91 and 316SS is collected. The constitutive model and stress functions are calibrated to the data using a standard approach. Finite element models of notched specimen geometry are generated to determine the extent that the multiaxial constitutive law matches experimental data. The normalized mean- squared error (NMSE) is applied to quantify the accuracy and conservatism/non-conservatism of the equivalent stress functions with respect to state of stress. After analysis it will be deduced which stress function is best suited for different types (quadrants) of multiaxial stress.

Funding Source: cCETR, Department of Energy

Recommended Citation:
Haynes, Amanda; Haque, Mohammad; Stewart, Calvin. "The numerical analysis of equivalent stress functions for multiaxial creep deformation, damage, and rupture" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1056

Sulfonated resorcinol-formaldehyde microspheres for the adsorption of methyl orange and methylene blue from water

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Most of the anthropogenic organic pollutants used in many industries such as paper, plastics, leather food, cosmetics and textiles are subsisting of dyes. However, this pollutant is discharged into ponds, lakes, canals rivers and sea, which is the key reason for the contaminations of water by dyes and pigments. The RF-SO3H microspheres exhibited excellent ability towards the adsorptive removal of methyl orange (MO) and methylene blue (MB) from water. A facile method for the generation of sulfonated resorcinol-formaldehyde microspheres (RF-SO3H) is reported. The maximum absorption capacity of the RF-SO3H microsphere towards the MO and MB was measured to be 416 and 450 mg/gm, respectively. Several features played a key role in the adsorption, which include the pH, initial concentration of dye and contact time. To examine the stability and recyclability a glass column was packed with RF-SO3H microspheres through which MO and MB were adsorbed under continuous flow condition

Funding Source: USDA

Recommended Citation:
Hernandez , Cesar; Islam, Tariqul; Ahsan , Ariful ; Noveron , Juan . "Sulfonated resorcinol-formaldehyde microspheres for the adsorption of methyl orange and methylene blue from water" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1042

Effects of Tamarisx spp. in riparian habitats

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Soil is a fundamental element of the natural world. It supports the life of different biodiversity of plants by providing water, nutrients and minerals. That support is being disrupted by soil salinization, an excess of salt, will hinder the growth of plants and their ability to uptake water. Salinization can occur by natural processes such as mineral weathering, it can also occur by irrigation in agriculture and other mechanisms. The study will focus on an invasive non-native species known as the Salt cedar, *Tamarix spp*. The Salt cedar is an aggressive colonizer that has the ability of outcompete native species of a region by secreting salts via stem or leaves. Those secreted salts will go back into the soil and increase the salt content. This study aims to observe the effects of *Tamarix spp.* in a riparian habitat located in El Paso, Tx. The hypothesis of the study is that *Tamarix ssp* will cause the soil salt content to rise. To gather the data, an electromagnetic meter (EM31) was used to measure electric conductivity near native species of El Paso, TX region. The results showed that *Tamarix spp.* grew on the place with the higher salt content in comparison with the native species. However, it cannot be concluded that the salt cedar was increasing the salt content of the soil.

Recommended Citation:
Hernandez, Janeth; Doser, Diane. "Effects of Tamarisx spp. in riparian habitats" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1070

Testing of chaotic frequency modulated signals for radar imaging applications

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Chaotic radar signals with wideband spectral properties have inherent advantages for radar imaging applications [Flores et al. 2002, Willsey et al. 2010]. For instance, a wideband spectrum allows for great accuracy in range and Doppler measurements, which leads to quality radar imagery of aircraft, ships, and terrain. More recently, the use of chaotic frequency modulated (CFM) signals with added spectral flexibility have been proposed for radar imaging [Pappu et al. 2015]. Specifically, this theoretical study showed that CFM signals derived from the Lorenz system achieve large bandwidths and are highly Doppler sensitive. Furthermore, a recent experiment conducted at the Army Research Laboratory using the Lorenz CFM has validated the theoretical framework for CFM in the presence of additive noise and Doppler shifts [Verdin et al. 2016]. To expand on this work, we propose to collaborate with the Army Research Laboratory researchers and show experimentally that selected three- dimensional chaotic systems may yield improved results. Wideband signals from at least six different chaotic systems will be digitally generated and implemented using a signal analyzer. Each signal will be tested using an advanced digital radio frequency memory, which will introduce realistic delay and Doppler shifts as well as different levels of additive noise. Experiments will be carried out in an anechoic chamber setting at the Army Research Laboratory, White Sands, NM. Collected data will be used to reconstruct the ambiguity function of each CFM signal, which will reveal the range and Doppler accuracy that can be achieved for different signal-to-noise power levels. Image quality will be quantified using information entropy measures.

Recommended Citation:
Ibarra Polanco, Alejandro; Vasquez, Andrea; Flores, Benjamin. "Testing of chaotic frequency modulated signals for radar imaging applications" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1007

Fracture resistance of polymer-bonded explosive simulant using the semi-circular bend test

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The fracture resistance of a polymer bonded explosive (PBX) simulant is experimentally investigated. Using a low-cost manufacturing method, various specimens ranging in different weight percentages from an 80% soda lime glass beads (SLGB) and 20% high impact polystyrene (HIPS) to an 84% SLGB and 16% HIPS composition are manufactured. The semi-circular bend test is applied in order to measure the fracture toughness and fracture energy of each of the specimens. Three-dimensional digital image correlation (3D-DIC) is performed to analyze surface displacements and calculate surface strains during testing. Digital microscopy and scanning electron microscopy (SEM) is performed to analyze the fracture surface and predict modes of crack initiation and crack propagation as well as failure of the material. It is determined that (i) the manufacturing process produces a credible simulant of PBX properties, (ii) the SCB test measures fracture resistance with a low coefficient of variation, and (iii) 3D-DIC, digital microscopy, and SEM predicts the crack initiation, path, and failure of PBX materials.

Recommended Citation:
Mach, Robert; Stewart, Calvin; Rabbi, Fazle; Stewart, Calvin. "Fracture resistance of polymer-bonded explosive simulant using the semi-circular bend test" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1088

Crowdsourcing drivers' interactions with road topology

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Modern smart phones incorporate a wide variety of sensors such as GPS, accelerometers, gyroscopes, compasses, and microphones. In additional to their traditional purposes, the data these sensors collect can be of use to state and federal transportation agencies. For example, gyroscopes and accelerometers data has been used to collect information on road surface and pavement conditions to support decision making on maintenance and infrastructure upgrades. In this proposal, we aim at collecting smart phones' sensors data from drivers in the city and analyze it to explore drivers' interactions with road topology. Such data can be analyzed in combinations with traffic regulations, crash and traffic violations databases. This research explores novel application of crowdsourcing smart phone data. This involves development of novel data analytical techniques that entails the definition of a mathematical and analytical models. The high temporal and spatial resolution of smart phone data could lead to a better understanding on the causes of traffic safety violations or crashes which is impossible to analyze with the present police records. This project has clear and direct implications in improving roadway safety, and aim to improve our understanding of drivers' behavior with roads topology. The ultimate goal of this proposal is to improve drivers' safety and inform the responsible agency to take actions on traffic control and management.

Funding Source: interdisciplinary reasearch fund

Recommended Citation:
Munoz, Sergio; Badreddin, Omar. "Crowdsourcing drivers' interactions with road topology" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1043

Effects of thickness on fracture resistance in bituminous mixtures

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The ASTM E1820 "Standard Test Method for Measurement of Fracture Toughness", limits the width to thickness ratio of disk- shaped compact tension (DCT) specimen to $2 \leq W/B \leq 4$. This restriction enforces the plane strain condition for linear-elastic and homogeneous materials only. Bituminous mixtures are visco-elastic and heterogeneous composites where the aggregate size is large in comparison to thickness. The W/B inequality of ASTM E1820 may not be appropriate for bituminous mixtures and needs to be tuned depending on composition (i.e. aggregate size). In this study, the effect of specimen thickness on the fracture toughness and energy of superpave (SP) hot mix asphalt (HMA) type-C is investigated. Fracture resistance tests are performed from $1.22 \leq W/B \leq 8.8$ to profile the transition from plane stress to plane strain fracture resistance of Type C. An investigation into the coefficient of variation of fracture resistance as a function of thickness is performed. Microscopy and 3D surface scanning are employed to understand the impact of thickness on the fracture surface. It is determined that the plane strain condition is not obtained in the existing fracture resistance standards for HMAs.

Funding Source: Southern Plains Transportation Center

Recommended Citation:
Oputa, Chinedu; Stewart, Calvin; Garcia, Eduardo ; Stewart, Calvin. "Effects of thickness on fracture resistance in bituminous mixtures" (2017).
COURI Symposium Abstracts, Spring 2017, ID= 985

Fabrication and characterization of titanium doped β-Ga2O3 thin films for application in oxygen sensors

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Currently, there is a growing demand for advanced sensors and controls for application in energy and defense related applications, where high temperature environments are usually encountered. Sensors operating in such applications have to be capable of withstanding extreme environments, such as high temperatures, high corrosive atmospheres, and high pressures. Among various candidate materials which can exhibit high sensitivity to oxygen, gallium oxide (Ga_2O_3), the stable oxide of gallium, is an attractive material for high temperature sensing. However, the response time of intrinsic Ga-oxide for oxygen sensing is poor. In this context, the present work was performed with titanium (Ti) modification of Ga-oxide to improve the structural stability and sensor performance at high temperatures (700°C). Titanium-doped (Ti) gallium oxide (Ga_2O_3) samples were deposited via RF-magnetron co-sputtering of Ti-metal and Ga_2O_3 ceramic targets by varying sputtering power to these targets. Crystal structure, morphology and electronic properties of Ti-doped Ga-oxide films were studied to understand the effect of Ti. The results obtained will be presented and discussed to establish the effect of Ti on the crystal structure and electronic properties of □-Ga_2O_3 films.

Funding Source: National Science Foundation

Recommended Citation:
Orozco, Cristian; Manandhar, Sandeep; Chintalapalle , Ramana. "Fabrication and characterization of titanium doped -Ga2O3 thin films for application in oxygen sensors" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1057

Evaluating the implementation of the culturally adequate birth in the Hospital of Pelileo, Ecuador from June to July 2016

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Introduction: This research evaluated the implementation of the culturally adequate birth (CAB) within the medical services offered in the regional hospital of Pelileo, Ecuador. Despite the high demand for the cultural technique and that the hospital had the equipped necessary to implement this technique; few procedures had been performed at the hospital. **Objective:** To assess the underlying reasons for the lack of CABs in the Hospital. **Methods:** Observational descriptive, Cross-sectional research survey study, with quantitative methods. The surveys consisted of 2 sets of surveys with about 15 multiple-choice questions. The surveys were administered to medical staff, pregnant women, as well as, those recovering in post-partum, during the months of June and July 2016. **Results:** 65.4 % of the medical personnel considered that the implementation would improve access to healthcare, yet 58.8 % of the women that were interviewed reported that they were never informed about the CAB. 78.6% of the women said they wanted to be able to choose the position to give birth and 90% of women wanted to be accompanied by a family member while giving birth. **Conclusion:** Lack of education and training of the CAB had caused a decline in the performance of the CAB in the Hospital. Future investigators need to make sure the medical personnel are well trained in this technique. Future researchers will need to conduct a more rigorous research to see if the maternal and neonatal mortality rates will decrease in the area because of the implementation of this technique.

Funding Source: National Institute on Minority Health & Health Disparities (NIMHD)

Recommended Citation:
Perez, Rebeca; Cervantes, Norma; Hernandez, Edith; Villacis, Marina; Miranda, Octavio; Ibarra-Mejia, Gabriel. "Evaluating the implementation of the culturally adequate birth in the Hospital of Pelileo, Ecuador from June to July 2016" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1090

Analytical dynamics and system controls approach for an inverted pendulum

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When forces are applied to a body there is a need for reaching equilibrium, for example, the legs of a person are used as inverted pendulums for our body to be in an state of equilibrium. In that escenario an inverted pendulum definition is accomplished; an inverted pendulum is used to balance bodies. In many cases called the perfect mechanical oscillator for accomplishing the state of equillibrium. In this case, a question rises, how does the inverted pendulum knows the forces that are being applied to the body? For a human body is necessary to have muscles in order to achieve equilibrium, but the solution for a robot is more interesting. In my case, I developed an algorithm in Simulink. Beforehand there is a need for sensors to serve as tranducers, such as a gyroscope which is applied to measure the angular velocity of the arm. As the inverted pendulum moves, one of the forces is going to be negtive and one positive, until it reaches again an equilibrium point and the summation of forces raches zero. This process repeats a lot of times: that is called a loop in the development of the algorithm in Simulink. The inverted Pendulum is a simple device that can be analyzed using Dynamics.

Recommended Citation:
Rodriguez, Arturo; Rangel, Pablo ; Gonzalez, Virgilio. "Analytical dynamics and system controls approach for an inverted pendulum" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1081

Summary of effort at UTEP in the Consortium for Integrating Energy Systems in Engineering and Science Education.

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The Consortium for Integrating Energy System in Engineering and Science Education (CIESESE) was established with the goal to prepare future engineers and scientist pursuing a career in energy systems. CIESESE created a partnership with Sandia National Laboratories, National Energy Technology Laboratory (NETL), Puerto Rico Energy Center (PREC), The Recinto Universitario de Mayaguez, The Universidad del Turabo, Miami Dade College, the University of New Mexico (UNM), and the University of Texas at El Paso in order to accomplish this goal. With the improvement in technology there is a great increase in demand for engineers in the field. Teaching students about these topics at an early age becomes fundamental to the growth of future engineers in order to further the development in energy systems. The Consortium will focus in creating opportunities for students of all grade levels to develop an interest and understanding in energy related topics. Undergraduate and graduate students will be given the opportunity of acquiring professional experience through research under a mentor. A team of students and faculty will develop educational modules for grade levels K-12 with the collaboration and guidance of the NASA MUREP Aerospace Academy (MAA). These educational modules will cover concepts such as storing, generating, and distributing energy by using in-class projects that will give students a hands-on experience and a better understanding of real world applications.

Recommended Citation:
Santiesteban, Jarenny; Lin, Yirong; Love, Norman. "Summary of effort at UTEP in the Consortium for Integrating Energy Systems in Engineering and Science Education." (2017). *COURI Symposium Abstracts, Spring 2017,* ID= 1072

Sediment and mineralogical analysis of aeolian transport to El Paso, Texas

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The El Paso, Texas region and Chihuahuan Desert in North America are known to have some of the most notable dust storms in the continent. Accumulated data of dust particles in the region have found that invertebrate propagules are being transported within the dust and travel until they colonize in hydrologically isolated basins throughout the region. Impacts of dust storms and Aeolian transport include further implications to life such as, Valley Fever in humans, hazardous driving conditions, and environmental damage to agriculture in some regions. A series of dust storm events were tracked and samples collected in East El Paso during the beginning of the 2016-17 high wind season. To further understand why and how dust impacts biological environments, mineralogical and sediment analysis were conducted to translate data from dust storm events during the dust storm season. Grain size analysis was identified by laser diffraction and averaged at about a particulate size of 123µm for the early 2017 storm season, about the same as dust collected at UTEP in 2012-2013. In many cases for 2017, not enough dust was collected to perform analysis. Mineralogy was determined through X-ray diffraction resulting in common mineralogy and sediment composition found throughout the desert region. Forward and back trajectories of wind direction for 2017 storms were utilized to understand where the dust came from and where it will go. Interpreting the data collected highlights compositional factors that can lead to how exactly Aeolian transport of mineral particles and invertebrate propagule occurs. Results aid determining how desert environments can sustain life of the simplest form as well as the geological characteristics, nature of the sources of the dust, and potential hazards.

Funding Source: National Science Foundation DUE 1565063

Recommended Citation:
Segura, Alison; Rivas, Jose; Gill, Thomas. "Sediment and mineralogical analysis of aeolian transport to El Paso, Texas " (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1017

Thermal alteration and characterization of exemplar space shuttle alloy systems

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The Ti-6Al-4V alloy is widely used in aerospace applications for its beneficial combination of properties. However, this alloy has high solubility for oxygen and thus a high reactivity. Recovered materials from the Space Shuttle *Columbia* artifacts suggest that the alloy underwent an accelerated degradation and combustion reaction when exposed to the extreme environment of re- entry. To better understand titanium's behavior when subjected to off-nominal conditions during spacecraft re-entry, the effect of thermal alteration on this alpha-beta phase alloy was investigated. Manufactured arc-jet test pieces have been exposed to a simulated atmospheric environment to be evaluated and compared to the high enthalpy, low-pressure surroundings experienced by the recovered *Columbia* artifacts. Optical metallography, x-ray diffraction, scanning electron microscopy, and energy dispersive x-ray spectroscopy were utilized to characterize the features of the arc-jet tested samples in order to draw qualitative relationships and differences between the thermally altered classifications of Ti-6Al-4V alloy arc-jet samples. Understanding the mechanisms that govern the material responses can reveal relations between the complex oxidation, ignition, and combustion reactions that occur upon titanium's exposure to this dynamic environment. In view of the spectrum of different material systems used to build spacecraft, recognizing the subtleties of what conditions will result in catastrophic failure is useful. Furthermore, the data obtained can be of tremendous value to designers of the next generation of orbital vehicles.

Funding Source: Office of the Provost, VPSA and COURI

Recommended Citation:
Smith, Arlene; Stafford, Stephen; Cone, Darren. "Thermal alteration and characterization of exemplar space shuttle alloy systems" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1062

Attitudes and barriers affecting hearing aid use in Hispanics living in the U.S. borderland region

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Nearly 1 in 7 Hispanic adults in the U.S. has hearing loss (Agrawal et. al., 2008). Hearing aids are the most effective treatment for an age-related hearing loss, but uptake rates among Hispanics has been estimated to range from 2% to 11% (Lee et. al., 1991). Factors contributing to low hearing aid use in Hispanics remains unclear. In this study, we examined attitudes towards hearing aid use among Hispanics living along the U.S-Mexico border.

Funding Source: COURI

Recommended Citation:
Sotelo, Loren ; Desjardins, Jamie. "Attitudes and barriers affecting hearing aid use in Hispanics living in the U.S. borderland region " (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1079

Fabrication and characterization of 3D printed BaTiO3/PVDF nanocomposites

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This paper presents a fabrication process to enhance homogeneous dispersion of $BaTiO_3$ (BTO) nanoparticles in polyvinylidene fluoride (PVDF) matrix nanocomposites using fused deposition modeling (FDM) 3D printing technique. The nanocomposites integrate the functional properties (piezoelectric, pyroelectric, and dielectric) of BTO with the flexibility and lightweight of PVDF. Traditionally, the simple yet effective way to fabricate the nanocomposites includes solvent-casting, spin- coating, and hot-embossing. However, these methods have disadvantages such as heterogeneous dispersion of BTO nanoparticles in PVDF matrix due to the higher density of BTO compared with PVDF and agglomeration during fabrication process. This heterogeneous dispersion could weaken functional and mechanical properties. Herein, fused deposition modeling 3D printing technique was utilized for homogeneous dispersion to alleviate the agglomeration of BTO in PVDF through two processes: filament extrusion and 3D printing. In addition, thermal poling was applied to further enhance piezoelectric response of the BTO/PVDF nanocomposites. It is found that 3D printed BTO/PVDF nanocomposites exhibit three times higher piezoelectric response than solvent-casted nanocomposites.

Funding Source: NSF

Recommended Citation:
Torres, Fernando; Kim, Hoejin; Li, Mingyue; Tseng, Tzu-Liang; Lin, Yirong. "Fabrication and characterization of 3D printed BaTiO3/PVDF nanocomposites" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1020

Structure and optical properties of tungsten doped hafnium oxide nanocrystalline films

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Hafnium oxide (HfO_2) is a high temperature refractory material with unique physical and chemical properties. The high chemical stability, mechanical and electrical properties, wide band gap (E_g ~5.7 eV) and a high dielectric constant (k~25) makes HfO_2 films suitable for applications in the field of structural ceramics, optoelectronics, magneto-electronics and electronics. While there are efforts in the literature on the effect of metal doping (such as Al, Cu) to tune the electronic properties of HfO_2 films, not much is known about W-doping effects into HfO_2. However, doping the refractory metal (such as W) into hard dielectric (such as HfO_2) will have implications to design materials and devices for defense related applications, where the extreme environmental conditions are often present. In the present work, we deposited W-doped films under variable processing conditions. W-doped HfO_2 thin films were deposited by radio frequency magnetron sputtering onto silicon and quartz substrates. The mount of W into HfO_2 is varied by varying the sputtering power applied to W-target in the range of 0-100 W. The chemical, structural, mechanical and electrical properties of W-doped films were studied. XRD patterns indicate the predominant (-111) peak of the monoclinic HfO_2. Incorporation of tungsten slowly induces amorphization as evidenced by the disappearance of peaks in the XRD patterns with progressive W increase in the films. Corroborating with structural data, optical and mechanical properties also indicate a change in the W-doped HfO_2 films. Based on the experimental data and analyses, a structure-composition-property relationship in W-doped HfO_2 films is stablished.

Funding Source: NSF PREM

Recommended Citation:
Torres, Marlyn; Uribe, Ann; Ramana, Chintalapalle. "Structure and optical properties of tungsten doped hafnium oxide nanocrystalline lms" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1035

Pyroelectric energy harvesting investigation of lithium niobate for high temperature applications

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The study of energy harvesting has been a prevalent research topic in the development of clean energy technologies within recent years. Thermal energy can be harvested by utilizing the waste of energy conversion systems such as turbines, heat pumps, power plants, etc. Lithium niobate (LNB) wafers were used as thermal energy harvesting devices. Lithium niobate is a pyroelectric material such that it creates a current dependent on temperature differences. This material was used due to its high Curie temperature (1100°C-1180°C), thus giving it the potential to be implemented into energy conversion systems. The lead- free nature of LNB also promotes its usage for health and environmental concerns. The performance of this material as an energy harvesting device was assessed by implementing it into a ventilated system that provided a temperature gradient with respect to time (dT/dt). This setup permitted sample testing's at different temperature ranges between 50°C to 250°C. The temperature change these LNB wafers were subjected to be recorded, as well as the current outputted by the pyroelectric ceramic. These two recordings were used to characterize the pyroelectric properties of the material. Using the current outputted by the material and a one Mega-ohm (MΩ) load, these gatherings were utilized to calculate the maximum power that the sample could generate. Between temperature ranges of 150°-200°C to 200°C-250°C, the generated power was 21.96 nW and 31.47 nW, respectively. It was observed that the pyroelectric coefficient increased as the temperature range increased. Further research into this phenomenon needs to be conducted.

Funding Source: National Science Foundation

Recommended Citation:
Wilburn, Bethany; Chavez, Luis; Lin, Yirong. "Pyroelectric energy harvesting investigation of lithium niobate for high temperature applications" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1080

The effects of flood irrigation on pedogenic CaCO3 and CO2 dynamics in drylands

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Global warming is caused by the increase of greenhouse gases, which trap the sun's rays and directs them towards the earths's surface. Most CO2, a greenhouse gas, is released by the burning of fossil fuels, however land use activities have also been attributed to the release of CO2. In the El Paso region most agricultural activities are completed by the usage of the flood irrigation method, which causes salt buildup in the soil. Since the water in the Rio Grande is high in salts, we hypothesize that flood irrigation causes the buildup of calcite and therefore causes the release of CO2. This projects aims to identify if flood irrigation leads to high calcite formation and causes the increase of CO2 release. During this research we collected two different types of data. The first set of data were collected from soil, water, and gas samples from two different sites in a pecan farm. The second set of data was collected from a column which was filled with quartz sand and treated to flood irrigation methods.

Funding Source: National Science Foundation DUE-1565063

Recommended Citation:
Valles, Karen ; Jin, Lixin. "The effects of flood irrigation on pedogenic CaCO3 and CO2 dynamics in drylands" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1063

LIFE SCIENCES

Tracing salinity inputs of the Rio Grande at irrigation canals of East El Paso

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Water of the Rio Grande is diverted at the American dam in to a system of irrigation canals designed to provide water to all users before it gets drained back to the river. The irrigation canals are administrated by El Paso County Water Improvement Dist. No. 1. This region of the Chihuahuan dessert has a extended agricultural areas along the valley. Water that is used for irrigation containing high levels of salinity can affect the crop yield and add to the loss of quality agricultural soil in this area. Although the anthropological sources have not been precisely identified, this research presents data from samples taken along the irrigation system and drains. This particular study works with the elemental concentrations of Ca, Na, B, Cl, SO4, Br, SO3, and NO3. The quantitative elemental composition and TDS levels help for mapping specific sources or areas of interest. With this research we get closer to explain the rising levels of salinity of the water once it enters the irrigation system of El Paso. We can start to isolate inputs of chemical weathering, underground water, farming and urbanization. The results can be use to mitigate the salinity levels and understand better their impact on agriculture in this arid-region were all water should be usable for most purposes.

Funding Source: Geological Sciences department at UTEP

Recommended Citation:
Alvarez, Luca; Ma, Lin; Garcia, Sandra; Ma, Lin. "Tracing salinity inputs of the Rio Grande at irrigation canals of East El Paso" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1016

Rooftop gardens as pollinator habitat in urban environments.

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Pollinators aid in the reproduction of >80% of all flowering plant species, including 75% of crops, an ecosystem service valued an estimated $29 billion. However, many pollinator populations are declining, due in part to human activities causing habitat alteration. Urban areas, in particular rooftop gardens, potentially serve as refuges. Pollinator use of rooftop gardens is understudied. The University of El Paso at Texas (UTEP) has a rooftop garden with plant species attractive to pollinators. We asked if rooftop gardens can attract similar abundances and diversity of pollinators as ground-level gardens. We counted pollinator visits to nine plant species in both the rooftop garden and on the grounds, with additional observations of three species only at ground-level. We observed each plant for 10 min, and identified insects that landed on a flower during biweekly surveys form Sept-Nov 2016. There were 204 pollinator visits to the rooftop and 812 on the ground-level. The most common pollinators for both types of gardens were native bees (47% of visits), followed by dipterans (15%) and honey bees (13%). Catmint (*Nepeta spp.)* attracted the most pollinators (27%). Although the rooftop garden had lower pollinator diversity and abundance, it was planted two months prior to our study, and might not have been discovered by pollinators. We will continue monitoring visits to the rooftop garden as it becomes established. The decline of pollinators makes research on urban refuges crucial. Increasing habitat through the use of rooftop gardens has the potential to mitigate further declines.

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Recommended Citation:
Barnes, Lara; Floyd, Kevin; Walsh, Elizabeth. "Rooftop gardens as pollinator habitat in urban environments." (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1018

Inhibitory activity on bacterial cells of organic plant compounds

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The world-wide emergence of multi-drug resistant organisms (MDROs) has become a public health crisis, as fewer or sometimes no antimicrobial agents are effective against these bacteria. The problem of antimicrobial resistance is even more threatening due to the limited number of new antimicrobials being developed. The objectives of the study are 1) investigate the antimicrobial activity of a collection of small organic compounds against a collection of multi-resistant *E. coli* and *Staphylococcus aureus* clinical isolates obtained from 4 hospitals (El Paso, Texas/Cd. Juarez) in our border region. 2) investigate if efflux pumps are involved in antimicrobial resistance. The organic compounds were extracted from plants. Then, the extracts were filtered using different solvents with different polarity. After extraction and filtration, the Kirby- Bauer Test was used to test the susceptibility of the bacteria to the plant extracts. The results showed that the plant extract from oregano leaves in the solvent Ethyl Acetate had a zone of inhibition of 0.8mm on the bacterial strain *E.coli* and a zone of inhibition of 1.4mm in the bacterial strain *S. aureus*. The results showing that there is antimicrobial activity in the organic compound.

Funding Source: NIH, NSF

Recommended Citation:
Cadena, Marlynn; Valenzuela, Carlos; Dominguez, Delfina; Skouta, Rachid. "Inhibitory activity on bacterial cells of organic plant compounds " (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1052

Factors that drive carbon flux at the Rio Bosque wetlands

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Other research concerning Wetlands focusing on Carbon flux has been done in different climates around the world. [1] Dr. Cook has done research in Mediterranean type climates and research in [2] Alaska has been done as well, however. Research in cold and hot -Arid climates located in the South-West of the United States has not been done in recent times. In this research project, we study the amount of Carbon Dioxide (CO_2) present in the water at the Rio Bosque Wetland over a 24-hr period in one of two sites. To measure CO_2, we used a portable CO_2 meter and a hand-held meter. In site one we found that the CO_2 levels present in the water is dependent upon the vegetation and temperature. When there were larger amounts of chlorophyll and platelets there was less CO_2 micro atmosphere (µatm) concentration. Levels increased at night when there was no photosynthesis and when vegetation died. Temperature also plays a role in the amount of CO_2 present.

Recommended Citation:
Carrillo, Alondra; Lougheed, Vanessa. "Factors that drive carbon flux at the Rio Bosque wetlands" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1027

HSPG2 mutations in a patient with cartilaginous phenotypes implicates perlecan in early craniofacial development

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HSPG2 encodes perlecan, a large, multi-domain proteoglycan that has a significant role in basement membrane maintenance, cartilage formation, and cell adhesion. Heterozygous mutations in *HSPG2* have been previously associated with Schwartz- Jampel Syndrome and idiopathic scoliosis, two disorders characterized by skeletal abnormalities. We used trio based whole exome sequencing to identify the causative mutation in a patient diagnosed with intellectual disability, dental abnormalities, and scoliosis of unknown etiology. We identified two potentially pathogenic variants in our index patient, a maternally inherited c.5998-7A>G variant in the non-coding promoter region and a paternally inherited c.4916C>T variant in the *HSPG2* coding sequence. We hypothesized that these compound heterozygous variants underlie the phenotypes present in our subject. To test this possibility, we used a morpholino mediated knockdown approach to analyze the function of *HSPG2* in developing zebrafish. Preliminary analysis suggests that zebrafish *HSPG2* gene is essential for craniofacial development and that knockdown of *HSPG2* results in truncated Meckel's cartilage and missing ceratobranchial cartilages. To validate these results, we are currently developing zebrafish with mutations in *HSPG2* using CRISPR/Cas9 endogenous genome editing approaches. Collectively, our results provide evidence that the HSPG2 protein plays a complex role in early craniofacial development.

Funding Source: Border Biomedical Research Center

Recommended Citation:
Castellanos, Barbara ; Castro, Victoria ; Enriquez, Vanessa; Quintana, Anita. "HSPG2 mutations in a patient with cartilaginous phenotypes implicates perlecan in early craniofacial development" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 996

Understanding the molecular mechanism of alcohol addiction: possible role of Gβγ-microtubule interaction

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Background: Alcohol is the most common drug of abuse and is a major economic and public health concern. Despite the magnitude of the problems associated with ethanol abuse, the molecular changes that take place during ethanol dependence are not well understood. In the short term, alcohol exposure alters G protein-coupled receptor (GPCR)-signaling pathways in the brain either by imitating neurotransmitter dopamine and/or by over-stimulating the brain's "reward circuit". It is believed that changes in the cytoskeletal architecture of neurons may provide a mechanism by which long-lasting plasticity modulates behavioral changes produced by chronic drug addiction. Results from our laboratory have shown that microtubules (MTs) (a major component of neuronal cytoskeleton) are regulated by Gβγ, an important component of GPCR signaling pathway. Research Goal: The goal of the present study is to test the hypothesis that alcohol exposure disrupts microtubule assembly/organization by altering Gβγ-MTs interaction. Methods: PC12 cells (a model cell line to study neuronal structure and function) was used to conduct this study. PC12 cells were either differentiated using Nerve-Growth Factor (NGF), or by overexpression of Gβγ (co-transfected with $G\beta_1$ [mCherry-tagged] and $G\gamma_2$ [YFP-tagged]) and subjected to whole cell lysis, subcellular fraction, co-immunoprecipitation, and confocal-scanning microscopy to evaluate the results. Results and conclusion: We discovered that alcohol exposure altered the assembly/organization of microtubules and neuronal morphology in NGF-differentiated and Gβγ-overexpressed cells. In addition, alcohol inhibited the interaction between tubulin and Gβγ. Results suggest that ethanol alters neuronal differentiation and morphology by modulating MT-Gβγ mediated pathway.

Funding Source: BBRC (NIH)

Recommended Citation:
Castro Gutierrez, Roberto; Aranda Barroso, Michelle; Roychowdhury, Sukla. "Understanding the molecular mechanism of alcohol addiction: possible role of G -microtubule interaction" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1049

Improving CRISPR/Cas9 germline efficiency using a combinatorial algorithmic approach

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The Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)-Cas9 system is a gene editing technology that allows targeted editing of any sequenced genome. DNA targeting is facilitated by a guide RNA (gRNA) that binds specifically to a target DNA region by complimentary base pairing, which activates Cas9 nuclease and initiates subsequent DNA cleavage. The efficiency and specificity of the CRISPR system is regulated primarily by the user designed gRNA sequence (20-22bp). Recent reports have demonstrated that the CRISPR system is plagued by off-target effects and therefore, new approaches to improve efficiency and specificity are warranted. We sought to improve efficiency by targeting a single gene, the zebrafish *hcfc1a* gene, using gRNAs designed from three commonly used gRNA design algorithms, ZiFit, MIT CRISPR, and GenDesk. Individual gRNAs were injected into the single celled zebrafish embryo and then embryos were reared to adulthood and screened for germline mutations. gRNAs designed solely with ZiFit software were completely ineffective (0/100 screened fish), but gRNAs designed by combining the outputs from several programs (ZiFit and MIT) had improved efficiency (5.8%). A retroactive comparison of these gRNAs using the GenDesk algorithm confirmed ZiFit only gRNAs had low predicted efficiency scores, but those including on multiple programs had much higher predicted efficiency scores. Collectively, our data suggest that a comprehensive and comparative algorithmic approach is necessary to achieve robust germline transmission with the CRISPR/Cas9 technology in zebrafish.

Recommended Citation:
Castro, Victoria; Quintana, Anita. "Improving CRISPR/Cas9 germline efficiency using a combinatorial algorithmic approach" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1008

Measuring inflammatory response of macrophages when infected with F. novacida mutants

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Francisella tularensis is a bacterial pathogen that escapes the phagolysosome when infecting macrophage cells. By escaping the phagolysosome Francisella is able to reproduce and eventually kill the cell. It is unclear what role lipids play in the metabolic process of *F. Tularensis* escaping the phagolysosome and establishing infection in macrophage cells. We focused on four *Francisella* mutants defective in essential genes responsible for the synthesis of glycerolipids and glycerophospholipids. These were ΔplsC (1-acylglycerol 3-phosphate acyltransferase), ΔgpsA (glycerol 3-phosphate-dehydrogenase), ΔpgsA (phosphatidylglycerophosphate synthesase), and ΔplsX (acyltransferase). For this study, we selected candidate mutants from a two-allele *F. novacida* mutant library (U112). *F. novacida* is closely related to F. tularensis and less infective to humans. Infection was monitored by Sandwich Enzyme-Linked Immunosorbent Assay (ELISA) measuring the Interleukin 6 (IL-6) production of mice macrophage cells 24 hours post infection. Our results suggest that glycerolipid synthesis is important for F. novacida to establish infection in murine macrophages *in vitro*.

Funding Source: BUILDing Scholars

Recommended Citation:
Chairez, Dania; Renteria, Eileen; Fregoso, Gisel; Duarte, Trevor; Spencer, Charles. "Measuring inflammatory response of macrophages when infected with F. novacida mutants" (2017). *COURI Symposium Abstracts, Spring 2017,* ID= 1015

Brain mechanisms of stimulant drug addiction: an investigation to the potential role of the dopamine vesicular transporter on amphetamine sensitization

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Addiction to stimulant drugs may be due to increased sensitivity (ie, sensitization) to repeated drug exposure and to environmental stimuli that become predictors for drug availability (ie, discriminant stimuli). A potential brain mechanism for addiction is the increase in dopamine (DA) overflow evoked by stimulant drugs (“neurochemical sensitization”), which leads to increased potency in the behavioral responses (“behavioral sensitization”). The mechanism that increases DA overflow is not known. The goal of the present study is to test the hypothesis that the vesicular monoamine transporter (VMAT) plays a role in sensitization. To accomplish this, VMAT function will be blocked during a sensitizing regimen of amphetamine (AMPH) treatment. Rats with unilateral dopamine lesions will be placed into four groups that receive treatment across 5 days: 1) CTRL, saline (1 ml/kg, ip); 2) SENS, AMPH (1.5 mg/kg); 3) TBZ (0.5 mg/kg, 30 min prior to AMPH) + AMPH; and 4) TBZ+SAL (to control for the effects of TBZ). One week later, all subjects will receive only AMPH to determine whether TBZ blocks sensitization. Rotational behavior, evoked by unilateral activation of DA by AMPH, will be measured throughout the sensitization regimen and the subsequent challenge day (15 min baseline, 120 min following AMPH). TBZ treatment is predicted to prevent the expression of behavioral sensitization observed in SENS rats. VMAT may serve as a common substrate for behavioral sensitization that manifests from drug challenge or discriminant stimuli. If this is true, then VMAT may serve as a target for developing pharmacotherapies against stimulant drug addiction.

Funding Source: NIGMS

Recommended Citation:
Cruz, Adelis; Ramos, Jeremiah; Hernandez, Edith; Herrejon, Ivan; Castaneda, Eddie. "Brain mechanisms of stimulant drug addiction: an investigation to the potential role of the dopamine vesicular transporter on amphetamine sensitization" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1051

The effects of soil fertility and crop plant adaptation to local environments in a rooftop garden

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Local agriculture can reduce the carbon emissions associated with food production. In dense urban areas, rooftops can provide garden space otherwise unavailable, yet full exposure to sun, wind, and rain can make it difficult to grow plants. Selecting plant varieties adapted to the local environmental conditions might increase production while minimizing water and fertilizer requirements. Our study investigated 1) if native-adapted varieties (NAT) of beans and squash grew better than commercially- developed varieties (CV) and 2) what effects soil fertility had on growth of the NAT plants. We planted six replicates of NAT and CV plants in sandy-soil supplemented with inorganic fertilizer. Three additional replicates of NAT plants in soil without fertilizer and in soil mixed with compost and inorganic fertilizer were also included. We measured area covered by each plant weekly from Aug-Nov 2016. We measured the concentration of nitrate, phosphate, and potassium in each soil treatment monthly. There were minimal differences between the size of NAT and CV varieties for both species. However, NAT planted in the compost-enriched soil were larger than the inorganic or no fertilizer treatments for both species (mean area covered, beans: 1076, 487, 420 cm^2, squash: 20752, 2370, 1290 cm^2). The compost-enriched treatment had more nutrients than the other treatments. Organic material in the compost can bind nutrients, preventing loss via leeching during irrigation. Seeds and fruits will be measured in subsequent seasons. Rooftop gardens with compost-enriched soils can produce food in urban environments, aiding the transition from traditional agriculture practices to more sustainable practices.

Funding Source: Department of Education, P120A130103-14, UTEP Green Roof Fund

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Recommended Citation:
Del Val, Luis; Floyd, Kevin; Walsh, Elizabeth. "The effects of soil fertility and crop plant adaptation to local environments in a rooftop garden" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1012

Histochemical analysis of lungs and lymph nodes ± CCR7 mediated metastasis of a mammary cancer in mice

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C-C chemokine receptor 7 (CCR7) promotes targeted lymphocyte migration to secondary lymphoid organs and breast cancer metastasis to the lymph nodes; moreover, CCR7 expression improves relapse-free survival in breast cancer survivors. We previously used Mouse Mammary Tumor Virus-Polyoma Virus Middle T antigen expressing mammary carcinoma cells, (MMTV-PyVMT), as a model system for breast cancer metastasis. We showed that 10^5 PyVMT mammary tumors without CCR7 expression injected into the mammary fat pad of FVB/NJ mice metastasized to the lungs, whereas 10^5 PyVMT tumors transiently transfected with CCR7 metastasized to the lymph nodes with significantly reduced metastasis to the lungs. We hypothesize that CCR7 in mammary cancer cells and leukocytes blocks the tumor metastasis to the lungs. Specifically, expression of tumor CCR7 promotes distinct immune cell environments in lymph nodes and lungs. Lung and lymph node tissue was removed from FVB/NJ mice, fixed in 4% paraformaldehyde, dehydrated via graded ethanol baths, paraffin embedded and cut into a series of 5µm sections on glass slides. Prior to analysis, slides were deparaffinized in xylene and rehydrated prior to staining with hematoxylin and eosin (H&E) or for immunofluorescence. H&E staining provides detailed views of cell structure and allow for morphological analysis of the tissue sections. By using fluorescently-tagged antibodies specific for dendritic cells, macrophages, B cells, T cells and neutrophils, we can determine, which leukocytes are associated with mammary tumor metastasis – tumor specific cells can be identified by a PyVMT specific antibody. Currently, we are analyzing histochemical data and our observations will be presented.

Funding Source: NIH

Recommended Citation:
Galindo, Dora; Martinez, Mitzi; Bill, Colin; Cunningham, Heather; Bill, Colin; Vines, Charlotte. "Histochemical analysis of lungs and lymph nodes CCR7 mediated metastasis of a mammary cancer in mice" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1040

Novel role of a mitochondrial protein (Drp1) in mitosis

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Mitochondria are the powerhouses of the cell and exist as a dynamic network that undergo cycles of fission and fusion. Dynamin-related protein 1 (Drp1) is a GTPase whose main roles are promoting mitochondrial fission and programmed cell death. Little is known about the specific roles of mitochondrial proteins outside the mitochondria. Here we identify a potential role for Drp1 in mitosis. Human cancer (HeLa) cells exposed to the Drp1 inhibitor Mdivi-1 showed mitotic defects. Similarly, depletion of Drp1 in HeLa cells using siRNA results in deformed spindles and multiple centrosomes. These results suggest that the mitochondrial protein Drp1 plays a role in mitotic spindle formation and function. Drp1 contains three alternatively spliced exons, which can produce variant isoforms that may have different roles. Two Drp1 isoforms were cloned into mammalian expression vectors and transformed into HeLa cells. Stable clones expressing these exogenous variants were obtained and will be used to further study the role of Drp1 in mitosis. This newly discovered role of Drp1 provides a novel connection between mitochondrial processes and mitosis, both of which are known to be defective in cancer cells.

Funding Source: URI, NIH

Recommended Citation:
Gonzalez, Pavel; Berger, Madison; Das, Siddhartha ; Diaz, Laura. "Novel role of a mitochondrial protein (Drp1) in mitosis" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 993

Identification of a potential mitotic protein in *Giardia intestinalis*

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Mitotic cell division is the process by which a cell produces two identical copies of itself. During a cell division cycle the cell duplicates its chromosomes during S phase, followed by segregation in mitosis. Chromosome segregation in mitosis is a complex and highly regulated process. The main mechanism regulating mitosis is the Spindle Assembly Checkpoint, which checks for proper chromosome attachment before allowing chromosomes to segregate. Studies in other organisms have identified the proteins Mad2 and Cdc20 as key players in the Spindle Assembly Checkpoint. Interestingly, little is known about the process of mitosis in the intestinal parasite *Giardia intestinalis.* Recent reports by other groups identified the Mad2 homolog in Giardia, but they failed to identify other components of the Spindle Checkpoint. Since Mad2 and Cdc20 are two proteins known to be binding partners, we hypothesized that a Cdc20 homolog must exist in Giardia. Here we identify a putative Cdc20 Giardia homolog using bioinformatics approaches. We report steps taken to clone this putative homolog into a vector and preliminary results on the tagging of endogenous MAD2 and CDC20 via homologous recombination in Giardia. Obtaining endogenously tagged MAD2 and CDC20 clones will allow us to study the function of these genes in Giardia mitosis. Understanding cell division in Giardia can potentially provide new avenues for treatment of infections by this parasite.

Funding Source: URI

Recommended Citation:
Guerra, Daisy; Apodaca, Jennifer; Das, Siddhartha; Diaz-Martinez, Laura. "Identification of a potential mitotic protein in Giardia intestinalis" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 984

Detection of human parechovirus in clinical respiratory, gastrointestinal, and neurological samples from patients with acute infections in the Republic of Panama

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Human Parechovirus (HPeV) is a non-enveloped, positive RNA virus with an icosahedral-shaped capsid, and is associated with gastrointestinal and respiratory diseases in children. Infections in the nervous system and neonatal sepsis have been documented in HPeV patients. Studies have detected this virus in several populations, however the detection of HPeV in Hispanic populations is not well- known. The purpose of this study was to detect HPeV for the first time in the Republic of Panama. A total of 398 clinical samples from Panamanian pediatric patients younger than 16 years of age between 2014 and 2015 were used for this study. A total of 200 respiratory, 104 neurological, and 94 gastrointestinal samples were collected. These samples were analyzed for HPeV by real-time RT-PCR, followed by genetic sequencing for HPeV-positive samples. Samples selected for this study tested negative for other viral agents. Of the samples analyzed, the following positive samples were identified: 1.0% (2/200) respiratory, 0.96% (1/104) neurological, and 5.3% (5/94) gastrointestinal samples. An attempt was made to sequence the 5'-UTR gene region for 8 HPeV-positive samples. Two of these samples had more than 90.0% similarity to an HPeV genome previously registered in the NCBI GenBank database. Human Parechovirus has been detected for the first time in the Republic of Panama. HPeV was found more frequently in gastrointestinal samples as compared to respiratory and neurological samples. The HPeV-positive neurological sample came from a one- day old patient: a possible vertical HPeV infection.

Funding Source: National Institutes of Health, Instituto Conmemorativo Gorgas de Estudios de la Salud

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Recommended Citation:
Gutierrez, Lizette; Saenz, Viridiana; Abrego, Leyda; Moreno, Brechla; Castillo, Marlene; Franco, Danilo; Pascale, Juan; Sosa, Néstor. "Detection of human parechovirus in clinical respiratory, gastrointestinal, and neurological samples from patients with acute infections in the Republic of Panama" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1037

Dietary supplementation with fish oil reverses high fat diet-induced enhanced sensitivity to quinpirole-induced penile erections

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Eating a high fat diet can lead to negative health consequences, including obesity, insulin resistance, and enhanced sensitivity to drugs acting on dopamine systems. Dietary supplements that are rich in omega-3 fatty acids, such as fish oil, can prevent these negative health consequences from developing, but it is not known if they can reverse these effects once they have developed. In order to test the hypothesis that dietary supplementation with fish oil will reverse the negative health consequences of eating a high fat diet (e.g., weight gain, insulin resistance, and enhanced sensitivity to quinpirole, a dopamine D2/D3 receptor agonist), male Sprague-Dawley rats were fed either standard chow (18%kcal from fat), high fat chow (60%kcal from fat), standard chow or high fat chow supplemented with 20% (w/w) fish oil. Body weight, insulin sensitivity, and drug sensitivity to quinpirole (0.0032-0.32 mg/kg), through yawning behavior and penile erections, were examined periodically throughout the course of the experiment. Results indicated that the high fat diet did indeed enhance drug sensitivity to quinpirole (e.g., leftward shift of the ascending limb of the dose response curve) in penile erections. However, fish oil supplementation successfully treated this effect by indicating a similar dose response curve to that of a standard chow diet. Further research is being conducted in order to understand the mechanisms underlying this effect.

Funding Source: National Institute of General Medical Sciences

Recommended Citation:
Hernandez-Casner, Caroline; Hussain, Samirah; Ramos, Jeremiah; Serafine, Kathrine. "Dietary supplementation with fish oil reverses high fat diet-induced enhanced sensitivity to quinpirole-induced penile erections" (2017). *COURI Symposium Abstracts, Spring 2017,* ID= 1003

Mutants from *Francisella tularensis* as possible candidates to activate NKT cells.

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Natural killer T (NKT) cells play a significant role in the immune response to many pathogens. Previous studies have revealed that NKT cells can be activated when they recognize a signal sent from the macrophage cell surface receptor CD1d. In order to activate this signal, a lipid is needed to stimulate CD1d, the most well described being α-galactosylceramide. Previous studies have shown that infection by the bacteria *Francisella tularensis* leads to NKT cell activation. However, it remains unclear what causes this activation. We hypothesize that a lipid produced by *Francisella tularensis* is capable of stimulating CD1d to generate a signal responsible for the stimulation of NKT cells. To test this, we extracted lipids from mutant bacteria deficient in lipid synthesis. Specifically, ΔpgsA (glycerol-3-phosphate dehydrogenase), ΔplsX (acyltransferase), ΔilbB (acetolactate synthase large unit), ΔplsC (1-acylclygerol-3-phosphate acyltransferase). Bacteria from these genetically altered clones were harvested from liquid media to carry out a lipid extraction. Lipids were then visualized through thin layer chromatography, followed by T cell receptor engagement assay *in vitro* to measure NKT cell activation. Our results suggest that lipid extracts from *Francisella tularensis* are great candidates for the possible activation of NKT cells *in vitro*.

Funding Source: BUILDing SCHOLARS

Recommended Citation:
Lara, Susan; Alcantara, Gustavo; Alcalde, Karen; Maltos, Ruby; Mata, Alexis; Duarte, Trevor; Spencer, Charles. "Mutants from *Francisella tularensis* as possible candidates to activate NKT cells." (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1021

Characterization of a subpopulation of putative glycinergic neurons in the mouse thalamus.

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The neurotransmitter glycine plays a major role in the CNS as an inhibitory neurotransmitter and the extracellular levels are regulated by glycine transporter 1 (GlyT1) and glycine transporter 2 (GlyT2). Thus far, it is known that GlyT2 is present in the brainstem where it plays a vital role in many sensory and motor functions such as audition and breathing, whereas GlyT1 has been reported to be localized in glial cells. Recent findings suggest the presence of glycinergic neurons in several areas of the forebrain. To further investigate the localization of neurons containing GlyT1 and/or GlyT2 in the mouse thalamus, we obtained coronal and sagittal brains sections and subjected to immunohistochemical analysis. Our preliminary findings provide evidence of a new subpopulation of inhibitory neurons in the thalamus, positive for several neuronal markers. To better characterize these neurons, we will perform additional immunostaining analysis with other protein markers of inhibitory neurons. We expect to fully characterize these neurons by ectopic expression of reporter genes under different promoters carried in adeno associated viral particles. These experiments should shed light into a new population of inhibitory neurons and contribute to the current neuronal inventory of the rodent thalamus.

Funding Source: National Science Foundation DUE-1565063

Recommended Citation:
Lira, Omar; Uresti, Zulema; Mendez, Lois; Garcia, Valeria; Miranda, Manuel. "Characterization of a subpopulation of putative glycinergic neurons in the mouse thalamus. " (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1050

Effect of Chemokine Receptor CCR7 on mating behavior in mice

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C-C chemokine receptor 7 (CCR7) is a G protein-coupled-receptor that modulates the migration of immune cells and immune responses. The role that CCR7 plays in the brain and behavior is not well understood***. Mouse models examining behavior are needed in order to identify the role that CCR7 plays in the brain.*** Studies have shown that CCR7 knock out (KO) mice have diminished cognition and increased anxiety as compared to CCR7 wild type (WT) mice. Additionally, observations in our laboratory have suggested that CCR7 KO mice do not breed as readily as CCR7 WT mice. It is not known whether and why CCR7 KO mice have behavioral deficits. It is hypothesized that CCR7 KO mice will have deficits in breeding as compared to CCR7 WT mice. Eight pairs of sexually mature CCR7 KO (n =4) and CCR7 WT (n = 4) mice were individually housed and behavior was video-taped for 72 hours. Raters counted the number of male mounts, intromissions, and ejaculations. Unpaired t- tests were used to examine possible differences between the groups. (Data was rated and analyzed for two pairs per group only.) It was found that, during the first hour of exposure, **CCR7**$^{-/-}$ male mice mounted the females significantly less times (M = 20.5; SE = 3.5) as compared to **CCR7** $^{+/+}$ (M = 88.75; SE = 0.25) mice, $t(2) = -19.45$, $p < 0.05$. No other significant effects were detected. These results suggest that **CCR7**$^{-/-}$ mice have a heightened sensitivity to novelty.

Funding Source: SC1 GM111172, STAR AWARD, BUILD

Recommended Citation:
Martinez, Mitzi; Martinez, Velia; Flores, Mayra; Parada, Zachary; Cervantes, Jaisel; Alvara, Christina; Bill, Colin; Vines, Charlotte. "Effect of Chemokine Receptor CCR7 on mating behavior in mice" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1054

Analysis of the effect of Zika Virus, Vesicular Stomatitis Virus, and Sendai Virus infection on the cellular SUMOylation system

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The 2009 swine flu pandemic and the recent Zika virus epidemic emphasized how harmful viral agents can be. Our current antiviral weapons exhibit substantial limitations: the production of vaccines against emerging viruses may take several months, while the high mutation rate of RNA viruses allows them to rapidly develop resistance against most antivirals. Therefore, there is an urgent need to develop new therapeutic approaches against viruses. A viable option is the development of therapies that increase the activity of cellular systems endowed with broad antiviral activity. Experiments previously conducted by us demonstrated that the cellular SUMOylation system is one of such systems. The activity of the SUMOylation system is augmented during influenza virus infections, triggering a global increase in cellular SUMOylation (GICS) that protects the host against influenza infection. To determine whether Zika Virus, Vesicular Stomatitis Virus, and Sendai Virus are capable of triggering a similar GICS, we infected MDCK cells and analyzed the activity of the cellular SUMOylation system after infection by immunoblotting. Our preliminary results suggest that the ability to trigger GICS may not be a shared feature of all single stranded RNA viruses but of only a few. Nevertheless, the possibility that exogenous activation of the SUMOylation system may help neutralize and limit viral infection in the host is not excluded. Assessing the role of the cellular SUMOylation system as a potential antiviral response system of the cell will play a critical role in our path to develop host-specific broad-spectrum antiviral therapies.

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Recommended Citation:
Medina Del Valle, Suleney; Castor-Macias, Jesus; Rosas-Acosta, German. "Analysis of the effect of Zika Virus, Vesicular Stomatitis Virus, and Sendai Virus Infection on the cellular SUMOylation system" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1069

Expression and purification of c-terminal helical region of human PERIOD-2 protein for structural studies

Victoria Miranda^, Jennie Choi, Neha Chauhan, Adan Castaneda, Ruben Cano, Neha Vijay, Noah Ruelas, Bianca Amezaga, Javier Lopez, Michelle Diaz, Fernando Legarreta, Supriyo Ray, Chuan Xiao*

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Circadian rhythm is our intrinsic 24-hour biological clock that synchronizes with external environmental cues such as day light. At molecular level, the circaidan rhythm is regulated by a time delayed transcriptional and translational loop composed of four critcal protein: Brain Muscle ARNT Like-1 (BMAL-1), Circadian Locomotor Output Cycles Kaput (CLOCK), Cryptochrome (CRY), and Period (PER). Disruption of the circadian rhythm can lead to various diseases such as cardiovascular, diabetes, cancer and other sleep disorders. C-terminal of human PER2 (hPER2c) has been shown to interact with CRY protein. Human PER2 C-terminal coding region was cloned and inserted into bacterial pCOLD-1 plasmid. The plasmid was transformedd into *E. coli* BL21 cells for hPER2c expressioin. Protein expression, cell lyses, and protein solubility studies were optimized in order to increase yield of hPER2c. Affinity purification is being optimized to attain pure hPER2c. Recombinant hPER2c structure will be characterized and used for other circadian related functional studies. These studies will provide insight on the PER-CRY heterodimeric interactions and their regulation of the circadian rhythm.

Funding Source: NIH.

Recommended Citation:
Miranda, Victoria; Choi, Jennie; Chauhan, Neha; Castaneda, Adan; Cano, Ruben; Vijay, Neha; Ruelas, Noah; Amezaga, Bianca; Lopez, Javier; Diaz, Michelle; Legarreta, Fernando; Ray, Supriyo; Xiao, Chuan. "Expression and purification of c-terminal helical region of human PERIOD-2 protein for structural studies" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1078

Quantification of mammalian gene expression using polyribosome profiling and quantitative PCR

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Mammalian cells (MCs) have developed response mechanisms to survive a range of environmental stresses. Amongst those response mechanisms, various types of post-translational modifications (PTMs) appear to constitute various critical mediators required for cell survival during stress. Remarkably, the activation of PTMs required for cell survival appears to be dramatically enhanced under stress, although little is known about the mechanisms underlying these observations. While transcriptional regulation plays an essential role in modulating overall gene expression in MCs, current literature indicates that transcriptional regulatory mechanisms appear to play a very limited role in regulating the activity of most PTM systems in MCs, thus suggesting a role for post-transcriptional regulatory mechanisms as the main modulators PTM system activity in MCs. To characterize the potential contribution of post-transcriptional regulatory mechanisms to the regulation of various PTM systems, we have implemented polyribosome profiling followed by quantitative reverse-transcription PCR (qRT-PCR). Polyribosome profiling is used to determine translation efficiency in the cell by observing mRNA-ribosome complexes. Multiple ribosomes on single transcripts indicates more efficient translation translation of that specific mRNA transcript. Utilizing protocols from previous studies, we fractionated polyribosomes from monosomes. After multiple optimizations, we were unable obtain the expected polyribosomal profiles. Nonetheless, the expertise gained during the execution of the experiments presented, specifically at the level of manipulating and isolating total RNA, has allowed us to rapidly incorporate alternative approaches which, combined with the use of bioinformatic tools, are likely to provide essential insights into the regulatory mechanisms governing the activity of PTM systems in MCs.

Funding Source: NIH

Recommended Citation:
Ontiveros, Carlos; Diaz, Arely; Rosas-Acosta, Germán. "Quantification of mammalian gene expression using polyribosome profiling and quantitative PCR" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1074

Changes in aquatic macroinvertebrate communities in a desert wetland and how these contribute to regional macroinvertebrate diversity.

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The relatively rare freshwater ecosystems in the arid southwestern United States are highly vulnerable to climate change. Thus their understanding and protection is critical. The Rio Bosque (RB) wetland (El Paso, TX) was created in 1997 and has been without a perennial water source since that time. In 2016, substantial improvements to the water delivery system allowed the delivery of water to two wetland cells for the entire summer, resulting in the flooding of more than 30 acres and the development of diverse wetland vegetation. This project aimed to examine how aquatic macroinvertebrate communities at the RB were improved through the provision of a year-round water source. Samples of invertebrates were collected from two different sites at the RB in summers of 2014 and 2016, and identified to genus or species-level. In 2014, samples were from a small vegetated channel flooded by groundwater, whereas wetland ponds receiving treated wastewater were sampled in 2016. Dragonflies and damselflies (Odonata) were the predominant aquatic species, followed by dipterans, ephemeropterans and coleopterans. Multivariate analysis (NMDS) indicates that the community composition was different among the 2 years, although there appeared to be no difference in the occurrence of sensitive species. These results will be compared with data collected from other sites throughout the region to determine how this created wetland contributes to regional diversity.

Recommended Citation:
Orona, Viridiana; Piña, Anna; Lougheed, Vanessa. "Changes in aquatic macroinvertebrate communities in a desert wetland and how these contribute to regional macroinvertebrate diversity." (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1019

Nicotine exposure alters neuronal cytoskeleton by PI3K/GSK3β mediated pathway

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Background: Tobacco use is a major public health and economic concern. Nicotine is the main addictive agent in tobacco and it is well established that nicotine interferes with the ability of neurons (brain cells) to send, receive, and process information, and thereby alters neural pathways in the brain. However, the underlying molecular mechanism of nicotine abuse and addiction is not well understood. It is believed that changes in the neuronal cytoskeleton may provide a mechanism by which long-lasting behavioral changes occur during chronic nicotine exposure. **Goal:** The goal of the present study is to understand the key molecular mechanisms that modulate microtubules (MTs), a major cytoskeletal filament in neurons, in response to nicotine exposure. Since phosphorylation of glycogen synthase kinase 3β (GSK3β), a downstream effector of phosphatidyl inositol-3-kinase (PI3K) is known to regulate microtubule assembly in neurons, our hypothesis is that nicotine exposure alters/disrupts microtubule structure in neurons through the PI3K/GSK3β pathway. **Methods:** To conduct the study, Wistar rats were exposed to chronic nicotine via osmotic pump for fourteen days. Brains from control and nicotine-exposed rats were subjected to immunoblot, immunohistochemical and confocal microscopic analysis. **Results and Conclusion:** We found that the nicotine exposure in rat brain inhibited neurite length and altered tubulin/MTs organization in neurons located in the nucleus accumbens (NAcc), a brain region known to be associated with nicotine addictions. Immunoblot analysis reveals that chronic nicotine exposure inhibited the phosphorylation of GSK3β by 42% in NAcc. These results may provide a mechanism by which nicotine modulate neuronal cytoskeleton.

Funding Source: BBRC (NIH)

Recommended Citation:
Palacios, Clarissa; Castañeda, Karen; Miranda-Arango, Manuel; O'Dell, Laura; Roychowdhury, Sukla. "Nicotine exposure alters neuronal cytoskeleton by PI3K/GSK3 mediated pathway" (2017). *COURI Symposium Abstracts, Spring 2017*, ID=   1038

Effects of increasing deciduous shrub litter on soil biogeochemistry

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Climate change is having dramatic impacts on arctic ecosystems. Increasing temperatures have led to longer growing seasons in the northern latitudes and an increase in deciduous shrub growth, a phenomenon known as "the greening of the Arctic". One effect of increasing deciduous shrubs is a thicker litter layer which may influence microbial activity, including production of extracellular enzymes. This experiment was performed in the Summer of 2016 in the alpine tundra of the Southwest Yukon, near the Kluane Lake Research station, Canada. We used a factorial experiment to examine the effects of shrub presence (using shrub removals) and litter abundance on the activity of enzymes produced by soil microbes. There were few significant effects of either shrub presence or shrub abundance on enzyme activity. Studying how litter production and shrub abundance affects artic ecosystems will help to understand how climate change may have a cascading effect on enzymatic production in Artic soils. It is crucial to understand the effects of climate change, especially how it affects carbon storage and soil biogeochemistry in alpine tundra ecosystems.

Funding Source: UTEP

Recommended Citation:
Pena, Samantha; Benhumea, Alejandro; Mclaren, Jennie. "Effects of increasing deciduous shrub litter on soil biogeochemistry" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1082

Infectivity and growth rates of *F. novicida* mutants defective in glycerophospholipid synthesis

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Francisella tularensis is an agent of the zoonotic disease tularemia. The bacterium executes intracellular parasitism through phagosomal escape into the cytoplasm and initiates host cell death. Here we test clones from the subspecies *F. novicida* U112 two allele mutant library for infectivity and localization within mouse macrophage cells. The bacteria analyzed are all defective in lipid metabolism, specifically glycerophospholipid synthesis. Glycerophospholipids are the main component of biological membranes and synthesis can result in the production of second messengers in transmembrane signaling. The mutants used are gpsA (glycerol-3-phosphate-dehydrogenase-[NAD+]), pgsA (phosphatidylglycerophosphate synthetase), plsX (acyltransferase), and plsC (1-acylglycerol-3-phosphate acyltransferase). We tested infection with the different clones through microscopy. This enabled us to see whether or not the bacteria were able to enter and escape the lysosome. Our results suggest that *F. novacida* glycerophospholipid synthesis is required for successful infection and phagolysosomal escape in murine macrophage cells *in vitro*.

Funding Source: BUILDing Scholars

Recommended Citation:
Ramirez, Brandon; Ayala, Kimberly; Shelton, Evelyn ; Lara, Daniel; Duarte, Trevor; Spencer , Charles . "Infectivity and growth rates of F. novicida mutants defective in glycerophospholipid synthesis" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1085

Effects of stress and environmental enrichment on tyrosine hydroxylase and ghrelin receptor expression

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The striatum of the brain, comprised of the caudate-putamen (CPu) and nucleus accumbens (NAcc), is crucial for motor and reward system functions, coordinating cognition and decision-making and processing reward stimuli and perception. Previous studies have investigated the striatum's role in addiction, due to its involvement in dopamine (DA) signaling, and how stress can potentially increase drug use. The mechanisms underlying the stress-addiction relationship, however, are not fully understood. One emerging factor is ghrelin, a stomach hormone that stimulates appetite but is also secreted in response to stress and acts in the reward circuitry. The purpose of this study was to examine ghrelin receptor (GhrR) and tyrosine hydroxylase (TH) expression in the NAcc and CPu of adolescent rats exposed to maternal separation (MatSep) and environmental enrichment (EE). We hypothesized that MatSep would increase TH and GhrR expression in both brain regions, and these effects would be reversed by EE. Rat pups were separated from their dams for 3h/d on postnatal days 2-14, then grew to adolescence in EE or standard living conditions. The NAcc and CPu were dissected and analyzed for GhrR and TH expression by Western blot. Stressed rats with EE showed 5x the locomotor activity of EE controls. TH expression in the CPu did not appear to be changed by MatSep or EE, while CPu GhrR was increased as much as 3-fold by EE compared to MatSep. This latter finding is contrary to our hypothesis, but suggests that EE may protect against the development of addiction.

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Recommended Citation:
Rastegari, Amir; Rodriguez, Roxana; Sierra, Jorge; Hamdan, Jameel; Saucedo, Sigifredo; Gosselink, Kristin. "Effects of stress and environmental enrichment on tyrosine hydroxylase and ghrelin receptor expression" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1030

HCFC1 regulates the function of neural precursors during early vertebrate development

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Mutation of the HCFC1 transcriptional co-factor causes *cblX* disorder, a multiple congenital anomaly syndrome characterized by defects in cobalamin metabolism, craniofacial abnormalities, intractable epilepsy, and severe neurological impairment. Previous studies have identified 5 mutations in the HCFC1 gene that cluster in the kelch protein interaction domain and result in defects in cobalamin metabolism. However, mutations outside of the kelch domain have also been identified, and are associated with neurological impairment and intellectual disability in the absence of any known metabolic disorder. Taken together these data raise the possibility that HCFC1 is a master regulator of normal brain development. Yet the cellular and molecular mechanisms by which HCFC1 regulates brain development *in vivo* are not completely understood. Human and mouse HCFC1 is X-linked and subject to X-linked compensatory mechanisms, which has limited our ability to determine the function of HCFC1 in brain development. To circumvent this limitation, we created a stable germline mutation in the zebrafish *HCFC1* ortholog, *hcfc1a*, gene using CRISPR/Cas9 genome editing. Functional analysis demonstrated that mutation of *hcfc1a* causes a dramatic increase in the number of neural precursors at 2 days post fertilization. These data are consistent with previous *in vitro* analysis. Our results provide evidence that HCFC1 plays an important role in the production, maintenance, and/or differentiation of neural precursors during early vertebrate development.

Recommended Citation:
Reyes, Joel; Castro, Victoria ; Quintana, Anita . "HCFC1 regulates the function of neural precursors during early vertebrate development " (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 990

Obtaining the major capsid protein of Cafeteria roenbergensis virus for structural studies

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Oceanic microbes produce approximately 97% of the Earth's oxygen. Their diversity and population are regulated by marine viruses. Cafeteria roenbergensis Virus (CroV) is a giant marine virus. Its host Cafeteria roenbergensis is a major microbial grazer of the ocean. Like other recently discovered giant viruses, CroV contains genes for DNA repair, transcription, and translation that normally considered as cellular not viral genes, thus, stimulating debate over their roles in the evolution of cells. CroV is covered by a protein shell (capsid) mostly comprised of major capsid proteins (MCP) that protect the genetic materials. The capsid is also essential to host-virus recognition. The long-term focus of this research is to generate a pseudo-atomic structure of the entire CroV by obtaining the crystal structure of the MCP and modeling it into the cryo-electron microscopic reconstructed map of the virus. In order to obtain pure MCP for structural studies, two methods are being explored. One method is to express the MCP as recombinant protein using bacterial expression system. MCP gene has been cloned and expressed in bacteria. Multiple methods are applied trying to solubilize the aggregated recombinant MCP. Another method is to extract MCP from large quantities of purified CroV. Quantitative PCR method has been used to optimize the CroV infection by monitoring the virus titer. After obtaining pure soluble MCP, the structure will be determined by X-ray crystallography. Information obtained from structural studies of CroV will be compared to other giant viruses, elucidating the evolutionary relationship between giant viruses from three-dimensional structural aspects, which might shed light on their roles in cell evolution.

Recommended Citation:
Reza, Elizabeth; Xian, Yuejiao; Chacon, Martin ; Choi, Jennie; Ray, Supriyo; Xiao, Chuan. "Obtaining the major capsid protein of Cafeteria roenbergensis virus for structural studies " (2017). *COURI Symposium Abstracts*, *Spring 2017*, ID= 1024

Expression and purification of human circadian proteins hCLOCK and hBMAL1 for structural and functional studies

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A circadian rhythm is defined as any physical, mental, or behavioral change that follows a 24 hour daily cycle. In mammals, the circadian rhythm is regulated by a transcriptional feedback loop, where Circadian Locomotor Output Cycles Kaput (CLOCK) forms a heterodimer with Brain and Muscle ARNTL-Like 1 (BMAL1) and transcriptionally activates the cycle. The circadian rhythm is crucial in maintaining organism homeostasis. Disruption of the circadian rhythm has been associated with sleep disorders, metabolic diseases, cardiovascular disease, and depression. The purpose of this project is to study and obtain the structure of full length human circadian locomotor output cycles kaput (hCLOCK) and human BMAL1 (hBMAL1). Full length hCLOCK and hBMAL1 genes were cloned into pCDF-Duet-1 expression vector, and transformed in *E. coli* BL21 cells. Expression optimization has been completed. Purification of hCLOCK1 and hBMAL1 is being done using affinity chromatography. After high purity hCLOCK and hBMAL1 has been obtained, crystallization and structural determination will be performed. Determination of the atomic structure of hCLOCK and hBMAL1 will provide important information for its function in the circadian rhythm, and for future development of therapeutic agents.

Funding Source: National Institute of Health

Recommended Citation:
Rodriguez , Jose ; Chacon, Martin; Choi, Jennie; Chauhan , Neha; Ray , Supriyo; Xiao, Chuan. "Expression and purification of human circadian proteins hCLOCK and hBMAL1 for structural and functional studies" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1058

Identifying the role of Schlafen 11 during West Nile Virus replication

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West Nile virus (WNV) is an emerging infectious disease capable of causing acute to severe encephalitis and meningitis in humans. This positive-sense, single strand RNA virus is spread by an infected mosquito vector and there is no treatment or vaccine. Currently, there are virtually no known cellular restriction factors controlling the replication of this virus. WNV is known to effectively utilize mechanisms that antagonize the interferon pathway, suggesting that interferon-stimulated genes (ISGs) may have an inhibitory role. In support of this hypothesis, we have found that the ISG, Schlafen 11 (SLFN11), impairs WNV replication. This replication is significantly enhanced in a SLFN11-deficient cell line and re-expression of this protein drastically reduces viral replication. However, SLFN11 does not affect replication of the negative-sense, single strand RNA virus, Vesicular Stomatitis Virus, indicating the specificity of the effect observed on WNV. To identify the specific protein domain responsible for this inhibitory effect, SLFN11 truncated mutants lacking either the amino (N-) or carboxyl (C-) terminal halves were generated and expressed in the SLFN11-deficient cell line. The derived cell lines were infected with WNV and we have concluded from our results that the antiviral effect resides in the N-terminal region of SLFN11. Future directions will include further classification of this N-terminal region to specify the exact domain responsible for this antiviral response. Our studies will further characterize the mechanism of action of this WNV restriction factor and improve our current understanding of novel antiviral mechanisms of the innate immune system.

Funding Source: 226141180A

Recommended Citation:
Salvador, Julienne; Valdez, Federico; Llano, Manuel. "Identifying the role of Schlafen 11 during West Nile Virus replication" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1028

Infectivity and growth rates of *F. novicida* mutants defective in glycerophospholipid synthesis

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Francisella *tularensis* is an agent of the zoonotic disease tularemia. The bacterium executes intracellular parasitism through phagosomal escape into the cytoplasm and initiates host cell death. Here we test clones from the subspecies F. *novicida* U112 two allele mutant library for infectivity and localization within mouse macrophage cells. The bacteria analyzed are all defective in lipid metabolism, specifically glycerophospholipid synthesis. Glycerophospholipids are the main component of biological membranes and synthesis can result in the production of second messengers in transmembrane signaling. The mutants used are ÄgpsA (glycerol-3-phosphate-dehydrogenase-[NAD+]), ÄpgsA (phosphatidylglycerophosphate synthetase), ÄplsX (acyltransferase), and ÄplsC (1-acylglycerol-3-phosphate acyltransferase). We tested infection with the different clones through microscopy. This enabled us to see whether or not the bacteria were able to enter and escape the lysosome. Our results suggest that *F. novacida* glycerophospholipid synthesis is required for successful infection and phagolysosomal escape in murine macrophage cells *in vitro*.

Funding Source: BUILDing Scholars

Recommended Citation:
Shelton, Evelyn; Lara, Daniel; Ayala, Kimberly; Ramirez, Brandon; Duarte, Trevor ; Spencer, Charles. "Infectivity and growth rates of F. novicida mutants defective in glycerophospholipid synthesis" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1014

Effects of early life stress on anxiety and amygdalar BDNF expression

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The amygdala (Amyg) of the brain is involved in emotional control and is implicated in affective disorders ranging from anxiety to addiction and post-traumatic stress disorder. Previous studies have shown that brain-derived neurotropic factor (BDNF) supports synaptic growth in the Amyg and mediates neuroendocrine and behavioral reactivity to stress. The intent of this research was to evaluate anxiety-like behaviors and the expression of BDNF in the Amyg of adolescent and adult female rats that were subjected to the early life stressor of maternal separation. This model provides a developmental challenge that impacts neural plasticity and can persistently alter neural function. We focused on females due to the higher incidence of anxiety in this sex in humans. Our hypothesis was that stressed rats would have increased anxiety and elevated BDNF levels compared to non-stressed controls. Whole litters were separated from their dams for 3h/d on postnatal days (PND) 2-14; control litters remained with their dams. The rats then grew to adolescence (PND 49) or adulthood (PND 70) and were tested for anxiety-like behaviors in an open field paradigm. Brain tissues were collected and frozen; the left Amyg was dissected and homogenized, and evaluated for BDNF expression by Western blot. In partial support of our hypothesis, stressed adult females showed less grooming behavior than controls, an effect not seen in adolescents. No significant differences were seen in Amyg BDNF expression in any group. Future studies will examine additional Amyg mechanisms, with the goal of finding new strategies for treating anxiety.

Funding Source: BBRC (NIH NIMHD MD007592), SMARTMIND (NIH NIDA)

Recommended Citation:
Starnes, Cheyenne; Banuelos, Raul; Hamdan, Jameel; Saucedo, Sigifredo; Jimenez, Cynthia; Gutierrez, Mayra; Sierra-Fonseca, Jorge; Gosselink, Kristin. "Effects of early life stress on anxiety and amygdalar BDNF expression" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1061

PHYSICAL SCIENCES

Estimating groundwater discharge into the ocean in the Yucatan peninsula

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The peninsula of Yucatan is a flat block of limestone, with a karstic aquifer that discharges into the sea. Because the peninsula does not have any surficial drainage system or river, and hence no surface runoff, the only way of water discharge is subterranean. To date there is no estimate of the magnitude of this discharge, thereby hindering efforts to better understand the dynamics of an already highly complex groundwater system. This study intends to estimate this discharge (Q) by solving the water balance equation, ΔS=PPT-ET-Q, using remote sensing products to account for the other terms in the equation. The change in storage (ΔS) will be retrieved from the satellite GRACE; precipitation (PPT) will be obtained from the Tropical Rainfall Measuring Mission (TRMM); and evapotranspiration (ET) will be retrieved from the Moderate Resolution Imaging Spectroradiometer (MODIS16) database from the Terra satellite. The divergence between ΔS and PPT-ET will be analysed to solve for Q using data from the entire Peninsula over the last 14-15 years. Our final aim is to quantify and understand the variability of Q and how it changes in response to climate variability or if there is a tendency (e.g. drying or wetting) and in which direction is going.

Funding Source: Academic Year-Pathways Research Experience Program (AY-PREP)

Recommended Citation:
Alvarez Rodriguez, Guadalupe ; Gutierrez, Hugo. "Estimating groundwater discharge into the ocean in the Yucatan peninsula " (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1032

Magnetic graphene oxide and boron nitride nanosheets coupled MOFs as efficient adsorbents for metal ions and organic pollutants

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The continuous growth in the population of the earth has caused a great demand of energy and food sources, this has also caused a rapid increase of pollutants in the environment. The removal of contaminants such as heavy metals and toxic organic chemicals from water sources is critical due to its continuous need around the world. The development of nano-technology, such as iron magnetic nanoparticles, metal-organic frameworks (MOFs), graphene oxide and boron nitride nanosheets, are being reported as a potential solution for this problem. The use of iron magnetic nanoparticles and MOFs gave rise to the utility of this technology as a new generation of cost-effective nanomaterials for contaminated water. Because of this, a novel series of nanocomposites based on iron oxide (Fe_3O_4) magnetic nanoparticles, and metal-organic frameworks of the type $M_3(BTC)_2$ (where M = Cu, Zn, Co, Ni; BTC = 1,3,5-benzenetricarboxylate) with graphene oxide and boron nitride nanosheets respectively were synthesized and tested for their ability to adsorb and remove metal ions and hazardous materials from aqueous solutions. The nanocomposites were tested for adsorption capacity and uptake time at different concentrations. To illustrate the potential and garner fundamental insight of this frameworks we used Transmission Electron Microscopy, Scanning Electron Microscopy, Powder X-Ray Diffraction, Infrared Spectroscopy, Thermogravimetric Analysis and BET surface area analysis.

Funding Source: National Science Foundation

Recommended Citation:
Arrieta, Roy; Ventura, Karen; Villagran, Dino. "Magnetic graphene oxide and boron nitride nanosheets coupled MOFs as efficient adsorbents for metal ions and organic pollutants" (2017). *COURI Symposium Abstracts, Spring 2017,* ID= 1068

Nutrient intake adequacy of energy, macronutrients and micronutrients in pregnant adolescents in a rural and urban community in Costa Rica

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Introduction: Adolescent pregnancy can bring adverse biological, social and emotional consequences to both the mother and the child. These effects are exacerbated when energy and nutrients are not consumed in the recommended amounts. The purpose of this study was to compare energy and nutrient intake in pregnant adolescents living in an urban community (Alajuelita) and a rural community (Golfito) in Costa Rica

Methods: A total of 29 participants were recruited to gather food intake using a 24-hour food recall during home visits. Every food and quantity reported was entered in the program *ValorNut* ® to generate a nutritional report. Results from this report were compared to nutritional recommendations for adolescents (Food and Nutrition Board, Institute of Medicine, National Academies, 2004). In addition weight/height for the gestational weeks was calculated to determine the nutritional state upon recruitment of the adolescents.

Results: 48.3% of participants were considered underweight, and only 2.4% were considered to be of “normal” weight. When individual nutrients were compared to recommended intake it was found that 82.6% of participants failed to meet recommended lipid intake especially monounsaturated fat. Participants’ diets were also deficient in fiber, iron, magnesium, potassium and vitamin B_6. Participants from Golfito consumed less energy, vitamins and minerals, while those from Alajuelita consumed more energy and less lipids.

Conclusion: Pregnant adolescents did not consume an adequate diet and might benefit from nutrition education aimed at selecting nutritious foods that could help them achieve dietary recommendations during pregnancy.

Funding Source: National Institute on Minority Health and Health Disparities

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Recommended Citation:
Avila , Alondra; Duarte, Maria ; Marin Arias , Lilliam ; Duarte, Maria . "Nutrient intake adequacy of energy, macronutrients and micronutrients in pregnant adolescents in a rural and urban community in Costa Rica" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 995

Implementing an electrochemical cell for in situ SAXS experiments to probe ion behavior in porous carbon membranes under applied electric potential

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Ion transport and sorption kinetics in soft-templated mesoporous carbon are being studied using the small-angle x-ray scattering technique (SAXS). Previous voltage-dependent small-angle neutron scattering (SANS) experiments have shown that this technique can detect structural changes due to ion adsorption. These changes occur at the solid-liquid interface at the carbon membrane pore walls as the voltage is varied. An electrochemical cell is being developed to study ion transport and sorption kinetics in soft-templated mesoporous carbon (MC-127). This material shows a morphology consisting of cylindrical mesopores with surfaces decorated by subnanometer-pores. In order to study ion kinetics inside the porous material, the cell must be tested and a structural model for MC-127 must be obtained. New x-ray transparent windows for SAXS measurements have been installed in the current cell, which was previously used for SANS studies. Efforts are underway to test the cell's performance in a vacuum environment (required for low-background SAXS), and the overall electrochemical performance for a given electrode/electrolyte assembly. This new capability to perform *in situ* electrochemical SAXS measureemnts will help create better supercapacitors with optimized electrolyte/electrode combinations.

Recommended Citation:
Ayala Rodriguez, Francisco; Fulvio, Pasquale; Anovitz, Lawrence; Banuelos, Jose. "Implementing an electrochemical cell for in situ SAXS experiments to probe ion behavior in porous carbon membranes under applied electric potential" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 103

Electrochemical hydrogen evolution with electron rich pseudo-square planar cobalt formamidinate complex as a catalyst

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The look for alternative fuels has been an ongoing problem without a sustainable solution. One alternate fuel that shows promise is H_2. The only feasible methods to make H_2 involves unaffordable metals such as Rhodium and Platinum as catalysts. The need to develop earth-abundant metal/organometallic molecular catalysts has been an ongoing pursuit since the early 20th century. Cobalt complexes have shown to be promising in this field. Electrochemical studies and gas chromatography have
shown that this cobalt formamidinate ($Co(Dippf)_2$) complex can electrocatalitically evolve hydrogen from acid at potentials between -1.2 and -1.4 V vs. Fc/Fc+ in acetonitrile. Cyclic voltamentry of $Co(DippF)_2$ in the presence of acid has shown redox waves that match with those of a Co(II)-Co(I) reduction, allowing for the implication of the presence of a Co(II) hydride. The mechanism followed by the catalyst and the isolation of the Co(II) hydride are further discussed.

Funding Source: MARC

Recommended Citation:
Barraza, Isabel; Ventura, Karen; Wu, Yanyu; Villagran, Dino. "Electrochemical hydrogen evolution with electron rich pseudo- square planar cobalt formamidinate complex as a catalyst" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1071

Recycled scrap-tires converted into organic adsorbents for water treatment

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A major class of anthropogenic organic pollutants consists of organic chemicals, which are known to be toxic, carcinogenic, and mutagenic to human beings and aquatic organisms. Therefore, the removal of organic chemicals is an indispensable part of water treatment. Herein, we demonstrate the preparation of a high capacity adsorbent based on waste tire by a chemical sulfonation step. The sulfonated scrap tire exhibited excellent ability towards the adsorptive removal of a model pollutant *viz.* methylene blue (MB) from the water. The maximum absorption capacity was measured to be 623 mg/g at pH ~7. The effect of pH, contact time, temperature, and initial dye concentration towards the adsorption capacity was also investigated. It was observed that at higher pH, the adsorption rate and capacity were better compared to lower pH. To investigate the potential practical applications, stability, and recyclability of waste tire rubber, a glass column was packed with the sulfonated scrap tire through which the continuous adsorption of methylene blue (MB) is demonstrated.

Recommended Citation:
Bragg, Dwayne; Islam, Md; Hernandez, Cesar; Alvarado-Tenorio, Bonifacio; Noveron, Juan. "Recycled scrap-tires converted into organic adsorbents for water treatment" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1005

Determining the density of the ionic liquid [C10MPy][Tf2N] confined in silica nano pores using small-and wide-angle x-ray scattering

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The structure of the ionic liquid (RTIL), [C10MPy] [Tf2N], confined in silicas with 8 nm and 2.8 nm pores was investigated. RTILs have negligible volatility, excellent thermal and electrochemical stability, and are of interest in areas such as nano-lubrication, energy storage, and environmental and materials synthesis. The dynamics, structure, and thermodynamics of RTILs under confinement are not completely understood, yet elucidating these properties is key to new advancements. Previously, confined RTIL dynamics were probed with neutron spin echo spectroscopy (NSE), and structural properties were probed with small-angle neutron scattering. In this work, small- and wide-angle x-ray scattering (SWAXS) results (Q-range:0.01-3 $\mathring{A}^{-1}$) of the confined RTIL are presented. The higher Q-range in these new measurements give access to inter-ion distances, and allows us to correlate them to the RTIL density inside pores and the NSE dynamics. The confined RTIL density was obtained by calculating the scattering invariant and applying a model to the empty and RTIL- filled silicas. The relation between RTIL structural peak parameters and measured density and dynamics will be discussed.

Recommended Citation:
Cano, Melissa; Fulvio, Pasquale; Banuelos, Jose. "Determining the density of the ionic liquid [C10MPy][Tf2N] confined in silica nano pores using small-and wide-angle x-ray scattering " (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1064

Synthesis and characterization of molybdenum bimetallic complexes with non-symmetric formamidinate ligands

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Mixed-valence systems consist of a multimetallic complex where two or more metal centers present different oxidation states. These systems can be manipulated to affect the selectivity of the molecule. Thus, use these compounds in redox catalysis for small molecule activation (e.g. CH_4, NH_3, H_2O). The ease of functionalization and stablished electrochemical properties of high bond order dimolybdenum compounds make them suitable to form such polarized systems. Moreover, the non- symmetric: N-(3-methoxyphenyl)-N'-(4-methoxyphenyl) formamidine, N-(4-Chlorophenyl)-N'-(2,6-diiso propylphenyl) formamidine, N-(2,6-Diisopropyl-phenyl)-N'-(3-methoxyphenyl) formamidine,and N-(2,6-Diisopropylphenyl)-N'-(2,4,6-trimethyl phenyl) formamidine will be used as structural ligands. It is proposed that the lack of symmetry in these ligands will disturb the electronic properties of the dimolybdenum system due to the different substituents in the phenyl ring. Both ligands and bimetallic complexes were synthesized and characterized by NMR, LCMS, UV-Vis, and single crystal XRD. Electrochemical techniques (e.g. CV) were used to study the electronic properties of these bimetallic systems. The compounds m,p-DAniF, DippAF, p-ClDF, Mo_2(m,p-DAniF)$_4$, and Mo_2(DippAF)$_3$ have been synthesized and properly characterized.

Funding Source: COURI

Recommended Citation:
Cervantes Martínez, Iván; Villagrán, Dino. "Synthesis and characterization of molybdenum bimetallic complexes with non-symmetric formamidinate ligands" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1066

Nanoscale complexity in room temperature ionic liquid mixtures: new properties for advanced applications

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Room-temperature ionic liquid (RTIL) mixtures, as electrolytes in supercapacitors, have desirable properties including a good combination of wide thermal and electrochemical operation range, and high conductivity in comparison to conventional electrolytes. The nano-structural properties of mixtures of RTILs (e.g., BMIM+[TFSI]−) with organic solvents (e.g., acetonitrile, dichloromethane, benzene, toluene, and tetrahydrofuran) are currently under investigation. The mass percentages at which macroscopic phase separation is visible, in the BMIM+[TFSI]−/ solvent mixtures, was determined by slowly increasing the solvent concentration. SAXS measurements at RTIL mass percentages lower than the phase separation concentration were carried out to determine whether nano-heterogeneity is present leading up to macroscopic phase separation, and to characterize its structural properties. We find an increase in the scattering signal at low-Q compared to the expected scattering from a simple mixture of two liquids, suggesting long-range composition fluctuations. Results and analysis of the length scales of the heterogeneity, and changes in intermolecular coordination in these systems will be discussed.

Recommended Citation:
Cuellar, Carlos; Osti, Naresh; Mamontov, Eugene; Banuelos, Jose. "Nanoscale complexity in room temperature ionic liquid mixtures: new properties for advanced applications" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1001

Method development for the analysis of Bisphenol A in milk.

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Bisphenol A (BPA) is an Endocrine Disrupting Chemical (EDC) commonly used in the plastics and food packaging industries. Because of its applications in common household products, BPA is found ubiquitous in our environment. A number of studies have reported BPA's capability to leak into different food sources, such as milk. As BPA can mimic hormones functions, it can cause developmental problems in children. With milk being considered the major food source for infants, it is important to monitor BPA and other EDCs in milk to ensure infant welfare. There are many existing methods for the detection of BPA in milk; however these methods are tedious and require the use of organic solvents. The aim of this project was the development of a simple, solventless, and sensitive method for the analysis of BPA in milk. The use of a solventless sample preparation technique called stir-bar sorptive extraction (SBSE) coupled with Thermal Desorption/Gas Chromatography/Mass Spectrometry, has proven to be a cost effective method for organic contaminants in liquid samples. Due to the high affinity of BPA to lipids, its extraction from milk is hindered (~30%). This project was to investigate parameters, such as pH, sonication, and temperature to increase BPA's recovery during sample extraction. Our results indicated that the recovery of BPA from milk increases with acidic and basic conditions, and that sonication time improve the recovery as well. For the future, the optimized method will be applied to breast milk and other dairy products.

Recommended Citation:
Encerrado, Angela; Lee, Wen-Yee. "Method Ddvelopment for the analysis of Bisphenol A in milk. " (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1065

Finding the water table along the Rio Grande

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Introduction: About 87% of the water used in the El Paso region comes from underground aquifers, which are vulnerable to contamination. Thus, understanding ground water interaction with surface flow is critically important for the protection of this valuable resource. This project, funded by the National Science Foundation grant Academic Year – Pathways Research Experience Program (AY-PREP), aims to examine how the Rio Grande interacts with the ground water using seismic techniques. Seasonal variations in the depth of the water table results from flow changes upstream for irrigation, and we plan to map these variations in the water table at selected sites along the Rio Grande. To accomplish this, we will be deploying a 24-channel geophone array using an active source to create artificial waves that display a refraction profile along the water table. The data will be retrieved from the data logger and then profiled using seismic Unix. Preliminary results from one survey show that we can detect the water table during the high water flow season.

Funding Source: National Science Foundation, Academic Year Pathways Research Experience Program

Recommended Citation:
Escanuela, Aide; Jacquez, Alan; Apodaca, Vanessa; Marquez, Amanda; Velasco , Dr. Aaron. "Finding the water table along the Rio Grande" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1025

Testing and overview of position sensitive neutron detectors

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The Instrumentation Division at Brookhaven National Laboratory (BNL) is developing a position sensitive neutron detector for small angle neutron scattering (SANS) for the Australian Nuclear Science and Technology Organization (ANSTO). This pad detector uses Helium-3 (He-3) as a converter gas for neutron detectors due to its high absorption cross-section for thermal neutrons. The detector will have an active area of 1 meter by 1 meter. It will provide x and y positions, timing, and energy for each detection event at a maximum rate of 1E8 neutrons per second. Pad detectors are an established technology, which is superior to wire based detectors. Testing of the electronic components for the detector is vital in the development of a high- resolution detector. Application Specific Integrated Circuit (ASIC) testing was conducted in order to select the highest quality chips. Statistical analyses of the test results were used in order to assist in the development of a more efficient pad detector. Testing of other electrical components such as the ASIC boards and readout boards were conducted in order to fine-tune the selection. As a result of this summer, I have learned basic ASIC design and radiation detection that has helped my professional development.

Recommended Citation:

Galindo, Jose; Ramana, Chintalapalle. "Testing and overview of position sensitive neutron detectors" (2017). *COURI Symposium Abstracts, Spring 2017,* ID= 1067

Electrical conductivity and native plants in the arid soils of the El Paso region

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This project examines the relationship between the electrical conductivity of arid soils and trees that are native and non-native to the northern Chihuahuan desert. Our study area is a region along the western bank of the Rio Grande near Valley Creek Park in El Paso's Upper Valley. Three different species of trees were examined in the study which include: Cottonwood, Screwbean Mesquite and Salt Cedar. The Cottonwood and Screwbean Mesquite are native species in the Chihuahuan desert, the Salt Cedar however is an invasive species that is known to increase soil salinity. Loss of arable land due to the accumulation of salts in soils is a growing problem among arid regions of the world, and has led to substantial degradation of soil productivity and desertification. Salinity is a severe environmental factors that can limit the productivity of agricultural crops and affects many native plants, because most plants are sensitive to high concentrations of salt in the soil. Electromagnetic induction is a commonly used geophysical tool for non-invasive mapping of soil electrical conductivity. One useful application of EM surveying is the quantification of salinity concentration levels in soils. Using the EM-31 electro-magnetic ground conductivity meter, we measured the electrical conductivity of the soils surrounding each tree, in order to estimate the amount of salinity in the soil. Measurements were collected in October, November, and February. By analyzing soil salinity around these native and non-native trees at different times of the year we determined how soil salinity changes with season.

Recommended Citation:
Garcia, Martin; Doser, Diane. "Electrical conductivity and native plants in the arid soils of the El Paso region" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 981

Electronic structure of bismuth iodide based organic-inorganic perovskite

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The hybrid organic-inorganic methylammonium lead iodide based solar cells have shown significantly enhancement in photoconversion efficiency in recent years with the current record of 22.1%. The material properties of this system have been studied extensively. At the same time a significant effort has also gone into understanding the properties of the materials as well as into developing similar types of materials. In this work we are studying the electronic structure of bismuth based hybrid perovskite materials using density functional theory. Two different crystal structures of bismuth iodide are being studied for their electronic properties. The structural and electronic properties of these materials will be presented.

Funding Source: NSF

Recommended Citation:
Kava, Donato; Zope , Rajendra; Baruah, Tunna. "Electronic structure of bismuth iodide based organic-inorganic perovskite" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1076

Application of activated carbon alginate composite materials for removal of endocrine disruptors in water.

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Bisphenol A (BPA) is an endocrine disruptive compound (EDC) that can leach out of plastic products and into the water supply. Its presence in natural reservoirs, wastewater and potable water—even in low concentrations—has caused concern as BPA mimics the activity of natural hormones. In addition to BPA, other EDCs, such as phthalates and aromatic hydrocarbons, have been found to cause mutations and hormonal imbalance. Therefore, it is of great interest to environmental chemists to search for ways to capture and degrade these compounds to ensure the quality of water supplies. Ongoing research has been focused on finding alternatives for effective removal of EDCs. Currently, wastewater treatment plants (WWTPS) employ different methods to eliminate toxins to make water drinkable but they are not required or designed to effectively remove EDCs.

Absorbent properties of activated carbon and alginate have been studied separately in the procedures of water filtration. Together, in the form of activated carbon alginate (ACA) beads, they have proven effective in fully removing BPA from samples. The purpose of this research is to expand upon the sorptive properties of ACA and describe new innovative ways to combine purification methods, such as biological degradation of pollutants like BPA, for the creation of new water treatment schematics. We hope that our designs can further be applied to mass production of ACA beads and their implementation in WWTPs and household water filtration devices. Coupling these potent absorbent materials with biological degradation could be the next solution implemented in water treatment.

Funding Source: BUILDing Scholars

Recommended Citation:
Lugo, Fernanda; Lee, Wen Yee. "Application of activated carbon alginate composite materials for removal of endocrine disruptors in water." (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 987

Zinc oxide thin film preparation by single solution deposition for perovskite solar cells

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Zinc oxide thin films are considered as promising candidates thin-film photovoltaics. Zinc oxide is an economically viable alternative layer for titanium dioxide and aluminum oxide because of the low annealing temperature needed to process thin-films. Because of the increasing interest of ZnO in thin film applications, a low-cost, high-yield synthesis approach needs to be used. The purpose of this experiment is to synthesize ZnO by the sol-gel method. The obtained solution is spin-coated on top of glass substrates and then annealed under different conditions to study optical and structural characteristics. Two different mediums, Rapid Thermal Processing (RTP) furnace and a hot plate, were used for sample annealing. Two samples were annealed on a hot plate, one of those samples had a cover while the other was annealed without cover. The last sample was annealed on a RTP furnace under vacuum. The three samples were annealed at 550°C for one hour. X-Ray Diffraction was used to examine the structural properties of the finished ZnO films. The optical characteristics of the thin films were analyzed using UV-Vis-NIR spectroscopy. The experimental results show that annealing parameters of the samples have a great impact on the final structural characteristics in the form of grain size and crystallization. The results also show that exposure to air and vacuum cause the final morphology of the thin films to exhibit little to no crystallinity and that a controlled annealing with little exposure to air and external moisture causes the grains to grow with greater uniformity and size.

Funding Source: National Science Foundation

Recommended Citation:
Martinez, Manuel; Hodges, Deidra; Kava, Donato; Galindo, Jose; Shahriar, Shaimum; Hodges, Deidra. "Zinc oxide thin film preparation by single solution deposition for perovskite solar cells" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1055

Selective ion release in metal-organic frameworks for antimicrobial applications

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Metal-organic frameworks (MOFs) have been studied due to their high surface areas, structural stability, and reusability potential, having a wide plethora of applications, from carbon dioxide adsorption, chemical sensing, to drug delivery. Moreover, the tunability of the starting materials allows us to design a MOF suitable to the adsorption of small molecules or ions at a controlled rate. Here, we present the findings of MOFs to transport, and accommodate to desired absorb and release rates through a series of $M_6(TATAB)_4(H_2O)_3$ MOFs, where M = Cu^{2+}, Zn^{2+}, Co^{2+}, and TATAB = [4,4',4"-((1,3,5-triazine-2,4,6-triyl)tris(azanediyl))tribenzoate]. The MOFs synthesized are tailored towards the development of ion releasing materials. The chelating properties of the ligand, TATAB, facilitate post-synthetic metalations without deteriorating the structural integrity of the MOFs. We propose these MOFs as a medium to transport ions and release them at a controlled rate in a biological setting. The metal ions Co^{2+}or Ni^{2+} have shown antimicrobial activity, therefore making them suitable candidates for ion adsorption. The structural characterization of the MOFs via infrared spectroscopy, elemental analysis, x-ray diffraction, and surface area and pore size analyses, as well as their ion adsorption and release properties, will be presented.

Recommended Citation:
Preciado, Joshua; Veleta, Jose ; Dueñas, Natalia; Ray, Supriyo; Villagra n, Dino. "Selective ion release in metal-organic frameworks for antimicrobial applications" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1029

Dipyrrinate ligands for the synthesis of anti-aromatic Ni norcorroles

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Dipyrrins, [RC(C4H3N)2H] (1), are a special class of redox and photochemically active molecules best known for their use in BODIPY fluorescent dyes. In our group, we have been exploring the coordination chemistry of dipyrrins on actinide and transition metals. In the course of this work, we have developed a method for the synthesis and isolation of α,β-unsubstituted Na[1] dipyrrinates. Addition of Na[1] to NiCl2 gives the Ni(II) complex Ni[RC(C4H3N)2]2 (2) in good yield. With 2 in hand, we are exploring its oxidation chemistry to make anti-aromatic Ni-norcorrole porphyrin-type systems for use in new energy storage media. The synthesis of 1 and 2 and our efforts to make Ni-norcorroles will be presented.

Recommended Citation:
Romero, Eduardo; Bolotaulo, Duer; Fortier, Skye. "Dipyrrinate ligands for the synthesis of anti-aromatic Ni norcorroles" (2017).
COURI Symposium Abstracts, Spring 2017, ID= 1023

Constructing a Directed Strongly Regular Graph with parameters (24,10,5,3,5)

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A Directed Strongly Regular Graph (DSRG) is a directed graph described by parameters (n, k, μ, λ, t), where μ, λ, and t count paths of length two between any two vertices in the graph, n is the number of vertices in the graph, and k is the in- and out- degree of each individual vertex. A Directed Strongly Regular Graph with parameters (24,10,5,3,5), might be possible to construct. This proof by construction will be attempted by breaking down the adjacency matrix into smaller blocks of sums of permutation matrices. Restrictions can be made in this case, because $\mu = t$. Further, assuming that the adjacency matrix is highly symmetric will aid the in the construction of the DSRG.

Funding Source: NSF DUE-1565063

Recommended Citation:
Salcido, Enrique; Duval, Art. "Constructing a Directed Strongly Regular Graph with Parameters (24,10,5,3,5)" (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 994

Controls of water treatments and social status on the drinking water quality of Ciudad Juarez, Chih.

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Water is vital, unfortunately the phrase "water is water", diminishes the public's appreciation of it as a crucial resource. Ciudad Juárez, Chihuahua is part of the Chihuahuan Desert and therefore, limited in freshwater supplies. The city's drinking water is sourced from the Mesilla and the Hueco Bolsons, which are shared between the U.S.-Mexico border. The purpose of this project is to determine if the drinking water of Ciudad Juárez follows their standards and regulations once it reaches the faucet and to see if the properties in the water are the same throughout the city. We collected questionnaires from Cd. Juárez citizens, comparing different water filtration options available to them. Surveys and 30 milliliters of tap water were taken at each sampling establishment. If any establishment was equipped with a filtration system, 30 additional milliliters were taken after treatment. We measured the electrical conductivity (EC) and pH levels of all samples, then analyzed their major anion and cation concentrations. The results showed that the waters vary significantly according to the region of the city. The levels of lead (Pb) were more than expected especially at the western part of the city. Survey results showed that people throughout the city have reported smell, color, and even particulates in their tap-water. Therefore, the majority utilize purified water jugs, that undergo reverse osmosis, as a drinking source. Future work involves trace metals analyses on the water samples. Finally, more samples are currently being collected to improve spatial resolution and statistical power.

Funding Source: Academic Year Pathways Research Experience Program, National Science Foundation, TIERA

Recommended Citation:
Soto-Montero, Paola; Ortiz, Anna; Jin, Lixin. "Controls of water treatments and social status on the drinking water quality of Ciudad Juarez, Chih. " (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 1045

Synthesis of new C60 and C70 fullerene derivatives for organic-inorganic hybrid halide perovskite solar cells.

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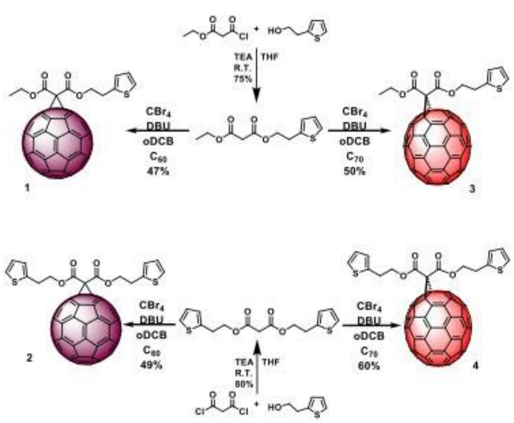
Perovskite solar cells (PSCs) have shown a remarkable increase in photoconversion efficiency (PCE), from 3.8% in 2009, to 22.1% in 2016.[1] The good electron transporting and solution processable properties of most fullerene derivatives make them the most popular electron transporting materials (ETMs) in PSCs.[2] To the best of our knowledge, the influence of different adducts on the PCEs of fullerene-based PSCs has not been fully explored to date.[3] In this work, we report new functionalized fullerene derivatives and their performance as the ETMs in PSCs.

Figure 1. Synthetic pathways for new C_{60} and C_{70} fullerene derivatives.

1. NREL, Best Research-Cell Efficiencies, http://www.nrel.gov/pv/assets/images/efficiency_chart.jpg, (accessed 2017, 2017).
2. Y. Fang, C. Bi, D. Wang and J. Huang. *ACS Energy Lett.* 2017, 782-794.
3. C. Tian, E. Castro, T. Wang, G. Betancourt-Solis, G. Rodriguez and L. Echegoyen. *ACS Appl. Mater. Interfaces.* 2016,
8, 31426-31432.



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Recommended Citation:
Zavala, Gerardo; Castro, Edison; Fernandez, Olivia; Echegoyen, Luis. "Synthesis of new C60 and C70 fullerene derivatives for organic-inorganic hybrid halide perovskite solar cells." (2017). *COURI Symposium Abstracts, Spring 2017*, ID= 997