



NEWSLETTER



Advanced Materials Research Institute

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THE DIRECTOR'S CORNER

Greetings! I am pleased to announce that our Outreach AMRI Summer Research Program is in full swing. This year's program will be held May 26 through July 24, 2015. We have a total of 23 summer program participants, including 13 undergraduates, 5 high school teachers, and 5 high school students. The programs providing support for this summer experience include the NSF-REU program, the LA-BoR LA-SIGMA program. Let's enjoy a successful and productive summer.

--Leonard Spinu

UNO Scientists Receive \$160,000 National Science Foundation Grant to Develop New Materials

Scientists at the University of New Orleans look to put a new 'spin' on technology. Professors Leonard Spinu and John Wiley of the Advanced Materials Research Institute (AMRI) have been awarded a \$160,000 National Science Foundation (NSF) grant to help develop new materials that could lead to important advances in data storage and communications. Unlike standard materials, which rely primarily on electrical pulses, the new materials the researchers are targeting, so-called "spin crossover" materials, may also be controlled by

light, heat, pressure, and magnetism. Spinu, the lead investigator on the project, comments that "the mobility of current devices demands an increased miniaturization and multifunctionalization where one device component can do more than one task." The new materials targeted by this team are expected to meet these needs. NSF funding is provided through the Early-concept Grants for Exploratory Research (EAGER) program, which is designed to support high-risk research that could lead to exceptional advances in science and technology. Dr. Spinu is a University Research Professor of Physics and Director of AMRI and Dr. Wiley is a President's Research Professor of Chemistry.

Physics Teachers Visit the Coldest Spot in Louisiana

On June 25, 2015, middle and high school teachers visited AMRI as part of an annual program to promote interest in Materials Science. The teachers were at UNO participating in a week-long camp cosponsored by the National Academy of Corrosion Engineers (NACE) and American Society of Materials (ASM). UNO Alumni, Alan Neesley of Monsanto Corp. describes the camp as presenting "an overview of different types of materials (metals, corrosion, plastics, concrete, glasses, and composite materials) and safe and interesting ways to present them to [their] students to excite them about materials science." (More information about the camps can be found at <http://www.nace->

foundation.org/Default.aspx?tabid=108.)

Seventeen teachers taking part in the workshop toured AMRI to see our various laboratories including those involved in thin films deposition, spark plasma sintering, electron microscopy, and magnetic characterization. Participants were especially interested in viewing the “Coldest Spot in Louisiana,” AMRI’s dilution refrigerator which can reach millikelvin (< -459 °F).



Graduate student, Daniel Adams (center, black T-shirt) from Dr. Spinu’s group, describes AMRI’s dilution refrigerator which can reach extremely cold temperatures, temperatures well below minus 459 °F.

2015 AMRI/Chemistry Summer Outreach Research Program

The 2015 AMRI/Chemistry Summer Outreach Research Program began on May 26 with the undergraduate students, who were joined by the high school students and high school teachers on June 1, and will continue through July 24, when the program closes with a barbecue cook-out lunch and research poster session.

This outreach research program has taken place every summer since 2002, when it began as a program for high school students and teachers. The next year, 2003, it was expanded to include undergraduate students. This summer program is designed to increase the

awareness and understanding of scientific research among undergraduates, high school students and teachers. No prior research experience is required for participation.

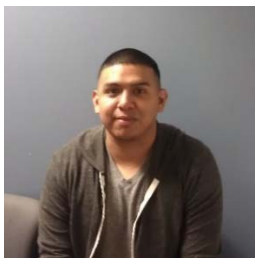
Participants are conducting research each on an independent project in chemistry, physics, biology, or materials science. They attend weekly seminar programs that allow for discussion of current scientific issues, general research concepts, and scientific ethics.

Summer Outreach Program Participants

NSF-REU Participants



Joana Franco attends the University of New Orleans and worked with Dr. Matt Tarr on layered perovskites.



Edwin Gomez from the University of New Orleans worked with Dr. Dhruva Chakravorty on conformational sampling of GM2 activator protein.

AMRI REU Participants



Gaurav Gyawali attends University of New Orleans and worked with Dr. Steven Rick on research involving channel rhodopsin mutants.



Natasha Bourgeois attends University of New Orleans and worked with Dr. Nicola Anthony and Dr. Katy Morgan on candidate markers in West African antelope.



Kayla Moore attends Spelman College and worked with Dr. John Wiley on the synthesis of zinc sulfide and manganese sulfide quantum dots.



Jessica Talbert attends University of New Orleans and worked with Dr. Leonard Spinu on the fabrication of magnetic nano-wires using a template based method.



Juana Reconco-Ramirez attends the University of New Orleans and worked in Dr. John Wiley's group on research with platinum nanoparticles in nanopeapod-based systems.



Samantha Wiard-Holt attends Oregon State University and works with Dr. Steve Rick on the effects of charge transfer on the properties of ionic liquids.

LA-SiGMA Participants



Cristina Azuara attends CA State University. She worked with Dr. Leonard Spinu on magnetization dynamics of synthetic antiferromagnets.



Manish Bhatt attends the University of New Orleans and worked with Dr. Steve Rick on random walk based scaling for optimizing replica exchange molecular dynamics.



Nirvan Bhattacharyya attends the Univ. of Michigan and worked with Dr. Chakravorty on the nature of metal ion mediated second shell hydrogen bonds.



Emyia Woods attends John Curtis Christian School and worked with Dr. Steve Rick on molecular dynamics of a cyclic, amphiphilic polymer.



Brandon Buchanan attends Allegheny College and worked with Dr. Leszek Malkinski on new methods of enhancing the photovoltaic effect of Ge/ GaAs solar cells.



Julianne Lamy attends Lusher Charter School and worked with Dr. Leszek Malkinski on in-vitro toxicity study of polarized BTO nanoparticles.



Hunter McDaniel attends LSU and worked with Dr. Leszek Malkinski on the magnetic properties of layered thin film multiferroic composites.

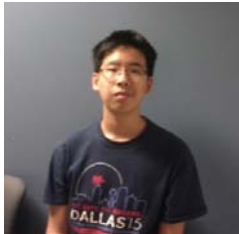


Leah Strickland attends Ursuline Academy and worked with Dr. Leonard Spinu on the study of magnetic properties of magnetic nanostructures.

LA SIGMA High School Participants



Mariza Francis attends Country Day High School and worked with Dr. Leszek Malkinski on a measurement setup to test vibrations of complex magnetic particles.



James Xiang attends Isadore Newman High School and worked with Dr. Dhruva Chakravorty on the nature of induction effects in hydrogen bonds.

LA SIGMA High School Teacher Participants



Karen Marshall is a teacher at the International School of LA and worked with Dr. Dhruva Chakravorty on transcending barriers in teaching chemistry.



Aleta Overby is a teacher at Loranger High School and worked with Dr. Steve Rick on molecular dynamics simulations of cyclic polymers.



Nadine Stewart is a teacher at Emily C. Watkins Elementary and worked with Dr. Leonard Spinu on static properties of magnetic nanowire arrays.



Joana Welch is a teacher at Destrehan High School and worked with Dr. Steve Rick on molecular dynamics simulations of cyclic polymers.

New Faces at AMRI

Prof. Juliano Denardin from the University of Santiago de Chile, Chile visited the AMRI laboratories from July 17-24, 2015. He continued collaborative research efforts with Dr. Leonard Spinu's group.

Congratulations to AMRI Graduate Assistants

A special congratulations is due to Ms. Sarah Wozny and Mr. Fahad Dhafer M. Alqarni for recently recently receiving their Doctor of Philosophy and Master's Degrees, respectively. These are students of Dr. Weilie Zhou's research group. Sarah's research thesis is "From Copper Zinc Tin Sulfur to Perovskites: Fabrication and Characterization of New Generation of Solar Cells" and Fahad's is "Study of Piezo-phototronic Effect on Type-II Heterojunction ZnO/ZnSe Core/Shell Nanowire Array."

Recent Publications

"Fabrication of Thick Porous Anodized Aluminum Oxide Templates," Jagnyaseni Tripathy and John B. Wiley* *J. Solid State Electrochem.* 2015, (in press).

"An UV/Visible Piezo-phototronic Photodetector Based on Truly Wide Band Gap ZnO/ZnS Core/Shell Nanowire Array," Satish C. Rai, Kai Wang, Jiajun Chen, Manish Bhatt, Weilie Zhou, ACS Nano, (DOI: 0.1021/acsnano.5b02081).

"Enhanced Broad Band Photodetection through Piezo-phototronic Effect in CdSe/ZnTe Core/Shell Nanowire Array," Satish C. Rai, Kai Wang, Jiajun Chen, Jason K. Marmon, Manish Bhatt, Sarah Wozny, Yong Zhang, Weilie Zhou *Advanced Electronic Materials*, (DOI:

10.1002/aelm.201570009, highlighted on front cover).

“Heterojunction Formation Between Zinc Oxide Nanowires and $\text{Cu}_2\text{ZnSnS}_4$ Nanoparticles for Inorganic Solar Cell Applications,”. Wozny, S.; Wang, K.; Alkurd, N.; Zhou, W; “Proc. 42th IEEE PVSC 2015, 2015 (accepted).

“Effect of Controlled Humidity on Highly Efficient Formamidinium Lead Triiodide Planar Heterojunction Solar Cells and Their In-Situ Characterization,” Wozny, S.; M.; Nardes, A.; Mercado, C.; Ferrere, S.; O Reese, M.; Zhou, W., Zhu, K.; Chem. Mater., DOI:10.1021/acs.chemmater.5b016912015

Recent Presentations

“Heterojunction formation between Zinc Oxide nanowires and $\text{Cu}_2\text{ZnSnS}_4$ nanoparticles for inorganic solar cell applications,” Wozny, S.; Wang, K.; Alkurd, N.; and Zhou, W. L., IEEE, 40th PVSE, New Orleans, June 2015.

“Effect of controlled humidity on highly efficient Formamidinium Lead Triiodide Planar heterojunction solar cells and their in-situ characterization,” Wozny, S.; Yang, M.J.; Nardes, A.; Mercado, C.; Ferrere, S.; Zhou, W.L.; and Zhu, K.; EMRS Spring Meeting, Lille, France, May 2015.

“Effect of controlled humidity on highly efficient Formamidinium Lead Triiodide Planar heterojunction solar cells,” Wozny, S.; Yang, M.J.; Nardes, A.; Mercado, C.; Ferrere, S.; Zhou, W.L.; and Zhu, K.; MRS Spring Meeting, San Francisco, CA, April 2015.

“Piezo-phototronic effect enhanced photo-detector based on three dimensional (3D) CdSe

nanowire array”, Satish C Rai, Jiajun Chen, Kai Wang, Manish Bhatt, Weilie Zhou, MRS Spring Meeting, San Francisco, CA, April 2015.

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