



# NEWSLETTER



Advanced Materials Research Institute

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## THE DIRECTOR'S CORNER

Greetings! This quarter has brought an exciting "advance" to AMRI. We have welcomed Advano, a renewable energy start-up. This is especially eventful because it represents a new paradigm in collaborations for AMRI and UNO. Advano is working as an independent company renting lab space in AMRI, while at the same time, they are able to readily access AMRI equipment and collaborate with AMRI researchers. AMRI benefits from equipment use fees and more importantly from the fast developing collaborations with Advano. Plans are already in the works for AMRI researchers to pursue funding opportunities with Advano through the Louisiana Board of Regents Industrial Ties Program.

Another success this quarter has been the return of both our undergraduate and high school summer research programs. These programs have run continuously for 14 and 15 years, respectively. While the undergraduate program is supported through federal funding, the high school program receives support through a variety of sources. To shore up this support, in the fall we will have a crowd funding campaign in an effort to raise funds for future summers.

Mardi Gras - We are already organizing the Mardi Gras annual review. The plan is to have the AMRI review on Thursday, Feb 8<sup>th</sup> and an all-day Mardi Gras Symposium on Friday, Feb 9<sup>th</sup>. Please stay tuned for details on the program. – *John Wiley*

## *New Start-Up Company Works Side by Side with AMRI*

Through a University of Louisiana system approved collaborative agreement, the startup company, Advano, is now renting space in AMRI to further their efforts to establish themselves as a new leader in the development of the next generation of anode components for rechargeable batteries. Success in these materials could increase the energy storage and lifetimes of batteries by several fold. So far Advano has over \$500 K in committed financial support from venture capitalists. (<http://www.advanotech.com/>)



Other companies rent space on campus but this collaborative agreement with Advano represents a new paradigm in that these researchers will also be collaborating with AMRI faculty and using AMRI instrumentation (for a fee) to carry out their research. This relationship gives Advano quick and inexpensive access to a number of pieces of key instrumentation while producing a small revenue stream for AMRI. Further, the impromptu discussion between AMRI and Advano researchers has already produced new avenues of collaboration such that joint research projects are naturally evolving, with the expectation that grant applications to Board of Regents Industrials ties programs are expected to follow.

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Also significant in this relationship is the involvement of UNO/AMRI alumni. The co-founder and chief technical officer, Dr. Shiva Adireddy, is a UNO graduate (M.S. 2011 and Ph.D. in 2013 in Chemistry). The lab manager is Mark Granier, B.S. in Chemistry 2015. One of the Advano summer interns, Pramathesh Maji, received a M.S. from UNO and in the fall will become a full-time student in the Ph.D. program in Chemistry.

The company started at Tulane University (TU) and the technology is based on a patent developed at TU. The President and CEO, Alex Girau, is a Tulane graduate (BS Loyola, MS Tulane).

A recent press release from UNO about AMRI and Advano can be found at:

<http://www.uno.edu/campus-news/2017/Renewable-Energy-Start-Up-Makes-UNO-Home.aspx>

### ***Upcoming Crowd Funding Effort***

AMRI will start a new crowd funding effort this Fall to raise funds for our summer high school research program. The target, \$10,000, will allow us to support 5 local high school students this coming summer. The summer high school research program was started in 2002 with funds from the LA Board of Regents. Since that time we were able to “piggyback” this program onto a number of grants. More recently, such funding opportunities have dissipated and so we will be seeking support from individuals. In the 16-year history of the program, we have been able to support 149 students. All the students are from the Greater New Orleans area and include a strong representation from underrepresented groups; historically we have involved over 36% African American, over 10% Latino, and over 60% female students. By raising these funds, we will be able to maintain and possibly expand the number of participants. It is important to note, that these funds will be used only for high school student stipends -

none of these funds will go to support UNO faculty or staff and, all the supplies costs from the summer research effort will be covered by the faculty’s labs or through support from AMRI.

### ***AMRI Summer Outreach Research Program 2017***

The 2017 AMRI/Chemistry Summer Outreach Research Program began on May 30 with 5 undergraduate students, who were joined by 5 high school students on June 5. The program continued through July 28, where the closing event included a poster session and cook-out lunch. This summer research program has continued every summer since 2002, when we started with a program for high school students and teachers. The next year, 2003, our program was expanded to include undergraduate students. The AMRI summer research program is designed to increase 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 on an independent project in Chemistry, Physics, Biology, Materials Science, Psychology, or Mechanical Engineering. They attend weekly seminar programs that allow for discussion of current scientific issues, general research concepts, and scientific ethics. We gratefully acknowledge the support for this program by the following sources: the Academy of Applied Sciences, through its Research and Engineering Apprenticeship Program, the National Science Foundation through Award No. NSF CHE-1412670, Award No. NSF CHE-1507295, and Award No. NSF DMR-1262904, and the LA Board of Regents through Contract No. BOR DOE(2014-17)-UNO.

## Summer Outreach Program Participants

### NSF-REU Undergraduate Participants



**Kylene Pickett, LA Tech  
University**

Kylene worked with Dr. Damon Smith researching different dispersion methods and concentrations of carbon nanotubes in 3D printed polymers and their effects on tensile strain and cross sectional topography.



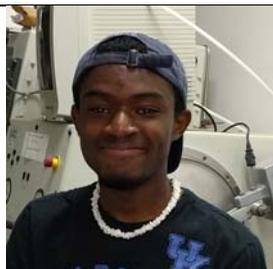
**Zhivon Johnson, Jackson  
State University**

Zhivon worked with Dr. Wellie Zhou on a materials science research project titled "Synthesis of Negative Electrode Materials for Supercapacitors."



**Katy Wong, Tulane  
University**

Katy worked with Dr. Steve Rick on molecular dynamics simulations of DMOE, a monomer of polyethylene glycol(PEG), in aqueous phase of water using a model called coarse-grain(CG).



**Anthony J. Ross, Georgia  
Southern University**

Anthony worked with Dr. Matthew Tarr on the danslyation of unactivated alcohols and surface oil from the Deepwater Horizon spill.



**Dana Karkoutli, Univ. of  
New Orleans**

Dana worked with Dr. Viktor Poltavets on both the synthesis of the doped nickellate,  $\text{LaNi}_{1-x}\text{M}_x\text{O}_2$  ( $\text{M}=\text{Cu}^{1+}, \text{Co}^{1+}$ ), an analog to HTSC cuprates, and the synthesis of  $\text{Ca}_3\text{VN}_3$  ternary nitride, a potential catalyst for ammonia decomposition.

### High School Student Participants



**Amaris Lewis, Lusher  
Charter School**

Amaris worked with Dr. Zhengchang Liu researching retrograde signaling transduction pathways in yeast cells through the use of genetic mutations.



**Julia McDow, Mount Carmel Academy**

Julia worked with Dr. John Wiley on research focused on different nanoparticles and implementing them into nanoscrolls, nanotubes, or making nanopeapods.



**Ashley Presley, Riverdale High School**

Ashley, with Dr. Elliott Beaton, researched children with 22Q11.2DS (DiGeorge Syndrome) and how the deletion impacts a child's ability to track multiple objects, compared to typical children in the same age group.



**Vigneer Reyes, Riverdale High School**

Vigneer worked with Dr. Viktor Poltavets on the creation of Copper-doped Nickelate compounds for the purposes of testing for superconductivity.



**Wenwen Tang, Benjamin Franklin High School**

Wenwen worked with Dr. Steven Rick using coarse graining techniques to create a model for the PEG polymer that runs faster, so that longer simulations and more properties of the molecule can be studied.

## ***Congratulations to Dr. Damon Smith***

Dr. Damon Smith, Assistant Professor of Mechanical Engineering, was awarded a \$200,000 LA Board of Regents grant. This research will improve the mechanical and optical properties of materials used in 3-D printing by developing nanoparticle additives. The hope is that these materials will ultimately increase the applications of 3-D printing. A recent press release from UNO can be found at:

<http://www.uno.edu/campus-news/2017/UNO-Faculty-Member-Awarded-150000-Toward-Improving-Functionality-of-3-D-Printed-Products.aspx>

## ***Dr. Viktor Poltavets Earns Award***

The Louisiana Space Consortium (LaSPACE) has awarded an AMRI faculty, Dr. Viktor Poltavets, \$34,370 for one year for the proposal entitled "Bulk Nanostructured Thermoelectric Materials with Quantum Confinement." Thermoelectric materials convert heat flow into electricity. This effect is utilized for power generation by radioisotope thermoelectric generators in many NASA missions (Apollo 12-17, Voyager 1, Voyager 2, Viking 1, Viking 2, Curiosity rover). The goal of the proposal is the investigation of bulk nanostructured thermoelectric composites that exhibit quantum confinement, which represents a new approach toward increasing the energy conversion efficiency of thermoelectrics. AMRI has extensive capabilities for thermoelectrics processing and characterization (spark plasma sintering, thermal diffusivity, and wide temperature range Seebeck coefficient measurement systems).

LaSPACE partners NASA with universities in Louisiana to promote scientific research, workforce development, and public outreach. The proposal will support a graduate student,

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Michael Raphael Shabetai, as well as an undergraduate student, Alana Dixon.

### ***Latest Visitors to AMRI Labs***

Dr. Mahyar Amouzegar, the Provost and Senior Vice President for Academic Affairs is UNO's Chief Academic Officer; Dr. Amouzegar toured AMRI on June 1. On June 5 and 6, groups of Junior and High School students toured AMRI as part of UNO's ACCESS program, a program that helps students better understand their educational opportunities and potential for education at the postsecondary level and assists them in achieving their goals. Dr. Gregg Lasen, Vice President for Business Affairs, Comptroller, & Chief Financial Officer toured AMRI on June 8. On June 14, Dr. Jason Lee from the the Naval Research Lab at Stennis Space Center toured AMRI; Jason will return in the fall to give a seminar on his research. On June 26, high school teachers, visited AMRI as part of the National Association of Corrosion Engineers (NACE) annual one-week workshop.

### ***Where are They Now?***

**Dr. Everett Carpenter (Ph.D. 1999).** Everett Carpenter was among AMRI's first graduate students. His research, which took place in Dr. Charlie O'Connor's laboratory (O'Connor was AMRI's first Director), involved the preparation of magnetic nanoparticles in reverse micelles. Since leaving UNO, Everett has served as a Research Chemist at the Naval Research Laboratory and then in 2004, became an Assistant Professor of Chemistry at Virginia Commonwealth University (VCU). He currently holds the rank of Full Professor at



VCU and is Director of their Nanomaterials Core Characterization (NCC) facility. He has published over 130 research articles, has several patents, and is a Partner in and Chief Technical Officer for Nanofoundry, LLC (est. 2013). Current research in his lab involves new nanomagnetic materials where his group has recently developed a new class of magnets which contain no rare earths.

**Dr. Sanjaya Ranmohotti (PD 2008-2011)** worked as a Postdoctoral Associate at AMRI, first in Professor Wiley's group and then in Professor Ferdinand Poudeu's group. Since leaving AMRI, Sanjaya continued his



postdoctoral work at the University of Michigan and Virginia Commonwealth University. At present, he is a tenure-track Assistant Professor at Governors State University, University Park, IL (just south of Chicago). During his stay at the University of Michigan, he performed research projects on iron based chalcogenide materials exhibiting room temperature ferromagnetism and semiconducting behavior and focused on the interplay between the both properties for potential application of these materials in spintronic devices. These projects resulted in two first author publications in the *Journal of the American Chemical Society*.

In 2012, Sanjaya moved to Virginia Commonwealth University where he was involved in developing methods for the assembly of gold, palladium, and platinum hollow nanoparticles into direct self-supported solid-state nanostructures with tunable mesoporosity and extremely low density. He developed, for the first time, a facile yet

powerful strategy for the self-assembly of Au/Ag, Pd/Ag, and Pt/Ag alloy nanoshells into large (cm-inch) self-supported monoliths by engineering the in-situ generated ionic strength of the precursor colloids. During this work he and his group also investigated the effects of the concentrations of bimetallic alloy nanoshells (Au/Ag, Pd/Ag, and Pt/Ag) on the evolution of the hydrogel and proposed a new synthetic procedure for metallic aerogels that involved the salt-mediated self-assembly. This work was published in *Chemistry of Materials*.

In the Fall of 2014, Sanjaya became an Assistant Professor of Inorganic Chemistry in the College of Arts and Sciences at Governors State University. His primary teaching interests are in General Chemistry, Advanced Inorganic Chemistry and Chromatography; his current research areas of interest include the manipulation of optical properties of hollow Pd/Ag and Pt/Ag nanoparticles synthesized by employing galvanic replacement reactions and Kirkendall effect. Sanjaya writes "What I find most awarding about teaching at GSU is being part of and contributing to the great transformation that is visible everywhere at GSU. At the same time, it is my goal as a teacher to share my knowledge and expertise with students so that they can use them on the course of their lives."

### ***AMRI Finally Joins 21<sup>st</sup> Century***

Dr. Viktor Poltavets, Assistant Professor of Chemistry and Associate Director of AMRI, recently created a webpage on *Facebook* for AMRI! We are excited to grow and strengthen our network of support for Materials Science research through social media. Please go to the link below and click the *Facebook* box/link for follow if you want to receive updates in your *Facebook* notifications list.

<https://www.facebook.com/AMRI.University.New.Orleans>



### ***Survey***

For those of you that have not yet had time to do so, we would appreciate your input. The survey should only take a few minutes. Also, at the end of the survey, you can include information that you would like to appear in the next newsletter – we would very much enjoy hearing from you. You can access the survey at:

[https://neworleans.co1.qualtrics.com/jfe/form/SV\\_0MUWaN72QmXa0o5](https://neworleans.co1.qualtrics.com/jfe/form/SV_0MUWaN72QmXa0o5).

### ***New Faces at AMRI***

**Clara Marotta, Corentin Pigot,** and **Céline Molegnana** join AMRI and Chemistry teams as visiting scholar interns from France. These students worked on nanomaterial research projects with Dr. Matthew Tarr and Dr. Viktor Poltavets. Some of the topics included methods for the determination of photochemically produced carboxylic acid in Sea Water from solar irradiation of petroleum, synthesis of bismuth (III) sulfide nanoparticles and optimization of bismuth sulfide grafting on TiO<sub>2</sub> for photocatalytic activity.

**Paula Kern** joins Dr. Leonard Spinu's research group as a Visiting Scholar. She is a Ph.D. student from the Federal University of Santa

Maria of Santa Maria, Brazil. Her research includes analysis of samples using SQUID and PPMS data.

### **Recent Publications**

Arjun Sharma, Lixin Liu, Sreeja Parameswaran, Scott M. Grayson, Henry S. Ashbaugh, and Steven W. Rick, "Design of Amphiphilic Polymers via Molecular Dynamics Simulations," *The Journal of Physical Chemistry B*, 120, 10603-10610 (2016).

Arjun Sharma, J. D. Smith, Keisha B. Walters, and Steven W. Rick, "Constant pH simulations of pH responsive polymers," *The Journal of Chemical Physics*, 145, 234906 (2016). [<http://dx.doi.org/10.1063/1.4972062>]

Zhi Zheng, Michael Retana, Xiaobing Hu, Ramona Luna, Yumi H. Ikuhara, and Weillie Zhou, "Three-Dimensional Cobalt Phosphide Nanowire Arrays as Negative Electrode Material for Flexible Solid-State Asymmetric Supercapacitors," *ACS Appl. Mater. Interfaces*, 2017, 9, 16986-16994.

Sara Akbarian-Tefaghi, Taha Rostamzadeh, Treva T. Brown, Clare Davis-Wheeler, and John B. Wiley\* "Rapid Exfoliation and Surface-Tailoring of Perovskite Nanosheets via Microwave-Assisted Reactions," *ChemNanoMat* 2017, 3, 538.

### **Recent Presentations**

Rahmatollah Eskandari, Leszek Malkinski, "Photovoltaic Enhancement with Ferroelectric HfO<sub>2</sub> Embedded in the Structure of Solar Cells", APS March Meeting, 13-17 March, 2017, New Orleans, USA.

Treva T. Brown, Sara Akbarian-Tefaghi, Taha Rostamzadeh, Alexis A. Blanco, Zachary L.

Highland, Jayne C. Garno, and John B. Wiley\* "Nano-Mechanical Properties of Novel Oxide Nanocomposites," Materials Research Society, Phoenix, AZ, April 2017.

Sara Akbarian-Tefaghi, Anamika Poduval, Paul Renquet, Taha Rostamzadeh, Clare Davis-Wheeler, John B. Wiley,\* "Impact of the Functionality of Perovskite-Based Nanosheets on Their Optical Properties," Materials Research Society, Phoenix, AZ, April 2017.

Sara Akbarian-Tefaghi, Treva Brown, Paul Renquet, Taha Rostamzadeh, Clare Davis-Wheeler, John B. Wiley,\* "Novel Hybrid Perovskite-Based Nanosheets via Rapid Microwave-Assisted Reactions" Materials Research Society, Phoenix, AZ, April 2017.

Kayla R. Moore, Treva T. Brown and John B. Wiley\* "Synthesis and Characterization of Quantum Dot@Hexaniobate Nanopeapods," 253rd National ACS Meeting, San Francisco, CA, April 2-6, 2017.

## **AMRI NEWSLETTER**

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