

# NMSU RESEARCH NEWS

Newsletter of the Office of the Vice President for Research



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# Research Rally Ushers in Project "Algal Biofuels for Aviation"

by Hamid M. Rad, OSI



On December 3rd, NMSU celebrated its U.S. Air Force Research Lab (AFRL) funded project: Algal Biofuels for Aviation, in a first-ever research rally hosted by President Couture and Vice President for Research, Vimal Chaitanya.

The AFRL has tasked the NMSU/UCF teams with addressing the R&D bottlenecks around scaling up production of algal-derived biocrude oil and its conversion into "drop in" aviation fuel for the Air Force. The NMSU team will focus on algal cultivation, harvesting, and oil extraction/fuel conversion technologies, while the UCF team will focus on blending and biofuel performance characterization. The lead investigator on the project, NMSU's Professor Shuguang Deng, spoke to the rally attendees, including U.S. AFRL representatives—Captain Mark A. Amendt, USAF AFMC AFRL/RZPF, and 1st Lt. Jacob McDermott, USAF AFMC AFRL/RZP—and members of the local press. Professor Jay Kapat, UCF Director of the Center for Advanced Turbines and Energy Research, also spoke at the rally.

During her introductory comments, President Couture highlighted the successful efforts of the NMSU algal biofuel team in obtaining funding for algal biofuel research from the Department of Energy as part of the National Alliance for Algal Biofuels and Bioproducts (NAABB). Professor Peter Lammers, Technical Director of the NMSU Algal Bioenergy Program spoke on the convergence of concerns regarding petroleum supply and demand, national security, and CO<sup>2</sup>-related global warming. The development of a reliable, domestic, renewable source of biocrude oil from algae has been championed by the Department of Defense, particularly the Air Force and Defense Advanced Research Projects Agency (DARPA). The issue is not whether jet fuel can be produced from algal biocrude oil, but whether biocrude production can be economically scaled up to greater than 100 million gallons per year, without competing for resources such as land and fresh water critical for food and fiber production.

The highlight of the event was the recognition that resources readily available in the desert southwest can be exploited for biocrude oil production without

creating a food-versus-fuel controversy. Optimum algal biomass production requires high light fluxes, inexpensive land, and abundant water resources. The first two are broadly available across the southwestern deserts and rangeland. Oleaginous marine microalgae can be cultivated using large underground reserves of brackish and saline water that are not suitable for other agricultural purposes and are also readily available in our region.

The key to the entire enterprise will be lowering algal biomass production costs, according to Dr. Lammers and his NMSU colleague Dr. Meghan Starbuck from the College of Business. This will require identifying valuable co-products in the algal biomass remaining after oil extraction, including crude protein and fiber useful for animal feeds, essential fatty acids like EPA that are critical for optimum neural development in children and cardiovascular health in adults. Just as the profitability of corn relies on multiple commodities from fructose sweeteners to corn oil and protein to bulk silage, it will be critical to develop multiple commodities from algal biomass in order for southwestern farmers and ranchers to contribute to national fuel security and rural economic development in the desert southwest.

This award includes NMSU investigators Shuguang Deng (Chemical Engineering), Shanna Ivey (Animal and Range Sciences), Nirmala Khandan (Civil Engineering), Hongmei Luo (Chemical Engineering), Tanner Schaub (Chemical Analysis and Instrumentation Laboratory), Meghan Starbuck (Economics and International Business), Wayne Van Voorhies (Molecular Biology), and John Xu (Biology). Partnering researchers from the University of Central Florida (UCF) include Richard Blair (Chemistry and Forensic Science), Jay Kapat and Ranganathan Jumar (Mechanical, Materials and Aerospace Engineering), and Yongho Sohn (Advanced Material Processing and Analysis Center).

For additional information about Algal Biofuels for Aviation, please contact Dr. Shuguang Deng at [sdeng@nmsu.edu](mailto:sdeng@nmsu.edu).

# Winners of the 2011 Interdisciplinary Research Grants

by Hamid M. Rad, OSI

Office of the Vice President for Research is pleased to announce the winners of the 2011 Interdisciplinary Research Grant awards:

**Hongmei Luo (PI)**

Assistant Professor, Chemical Engineering

**Stephan Zollner (Co-PI)**

Department Head, Physics

Project title: *Design, Synthesis, and Characterization of Functional Ceramic Oxide Nanocomposite Film*



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Stephan Zollner  
zollner@nmsu.edu

**James McAteer (PI)**

Assistant Professor, Astronomy

**Laura E. Boucheron (Co-PI)**

Assistant Professor, Electrical and Computer Engineering

Project title: *Fields, Flares, and Forecasts: Supporting NMSU's Aerospace Research*



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mcaateer@nmsu.edu



Laura E. Boucheron  
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**Robert Wood (PI)**

Department Head, Human Performance, Dance, and Recreation

**Ou Ma (Co-PI)**

Associate Professor, Mechanical Engineering

Project title: *NMSU Initiative for the Prevention of Falls in Older Adults*



Robert Wood  
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**Kevin D. Houston (PI)**

Assistant Professor, Chemistry and Biochemistry

**Jessica D. Houston (Co-PI)**

Assistant Professor, Chemical Engineering

Project title: *High-throughput Fluorescence Lifetime Cytometry: Protein Localization Assay Development and FRET Partner Identification*



Kevin D. Houston  
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Jessica D. Houston  
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These projects were selected by a committee consisting of representatives of the NMSU colleges. Evaluations were made based on technical merit of the proposed research, potential impact of the proposed research on the University's research programs and national visibility, potential for future funding and sustainability, student involvement, and qualifications of the PI and Co-PI. A total of 19 proposals were received in response to the call for proposals. All NMSU faculty and researchers were eligible for these awards. The winners received \$50,000 each in funding from the Office of the Vice President for Research. Recipients will be required to submit 6-month and 12-month reports on their accomplishments and fi-

nancial expenditures.

For additional information about these projects, please contact the principal investigators.

# Meet NMSU's New Biosafety Manager

The Vice President for Research - Office of Compliance is pleased to announce the appointment of Dr. JoAnne Dupre as Biosafety Manager. Nellie Quezada-Aragon, Director of the Office of Compliance, states, "I am glad to have JoAnne on staff. She will be of great assistance to all researchers working with microorganisms, biohazardous materials, and recombinant DNA in research and teaching."

Dr. Dupre is a graduate of NMSU, with a PhD in Biology and a minor in Molecular Biology (2010), and a Bachelor's degree in Occupational and Environmental Health with a minor in Environmental Management (2005). Her research interests include antibiotic resistance in bacteria and food-borne pathogens. Prior to joining the Office of Compliance, she was an analyst in NMSU's Southwest Center for Animal Health, Food Safety, and Biosecurity Laboratory studying rapid methods for the detection of microorganisms in food.

*"As a microbiologist, I want to see the names of my colleagues in print for the outstanding quality of their work, not associated with a lab-acquired infection."*

As the Biosafety Manager, Dr. Dupre is the liaison between the Institutional Biosafety Committee (IBC), which oversees all biological research, and investigators who work with microorganisms and recombinant DNA. In support of the IBC, Dr. Dupre will conduct periodic laboratory inspections and coordinate IBC meetings to review new protocols. Many of her activities combine components of programs for other NMSU safety committees, the Office of Compliance, and the Environmental Health and Safety Office (EH&S), so you are likely to meet her in several places around campus. "I have had the privilege of working with researchers in four different colleges on the main campus," she says, "and I appreciate the diversity of students and staff here. NMSU is a great place to be involved in science, and we have a lot of valuable interdisciplinary collaborations. People in our research areas have a wide range of experience with biological safety issues, from distinguished investigators to first-time-in-the-lab summer students. Because of this, it is easy to take for granted that everyone around you is aware of safety concerns and uses



Dr. JoAnne Dupre NMSU's Biosafety Manager  
([jdupre@research.nmsu.edu](mailto:jdupre@research.nmsu.edu))

good work practices. A person can be skilled in molecular biology techniques, but hasn't been trained to use an autoclave. Or someone might be a geneticist, but not give much thought to routes of transmission for infectious disease. My role is to support principal investigators by providing supplemental training and resources to help decrease any potential hazards that might be associated with their work."

Dr. Dupre will be conducting biological safety training and animal use safety classes each month at the Environmental Health and Safety Office. The Biosafety Awareness class is required for everyone who works with Biosafety Level 2 (BSL-2) organisms, and is recommended for personnel in BSL-1 labs. This class covers laboratory safety, aseptic technique, and lab waste handling, CDC/NIH BMBL guidelines and standards of practice, and the use of autoclaves, biological safety cabinets, and personal protective equipment. The Animal Worker Safety class is required for individuals working with or around animals at NMSU campuses, farms, ranches, research areas and associated facilities. The class covers the Occupational Health and Safety Program, the Institutional Animal Care and Use Committee (IACUC), potential hazards and physical safety, allergies, waste decontamination, zoonoses (diseases that can be shared between humans and animals) for large animals, and the Medical Evaluation program. Dr. Dupre stated, "In addition to the classes that I teach, researchers should be aware of the other classes that may be required before beginning research, such as Radiation Safety, Respirator Safety, and Hazardous Waste Management."

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# NMSU Student Back from Internship with U.S. Treasury Department in Washington D.C.

by Hamid M. Rad, OSI

Courtesy photo



Zackary Anthony Quintero

Zackary Anthony Quintero, NMSU student majoring in Government, returned from a semester internship at the U.S. Treasury Department, where he worked with various bureaus such as the Office of the Comptroller Currency, Bureau of Public Debt, and

other offices. Zackary also worked in Security and Emergency Preparedness Office whose goal is to maintain the fiscal solvency of the treasury during emergencies and making sure federal employees can still operate during a crisis.

Zackary helped co-coordinate a \$2.7 million campaign known as Combined Federal Campaign (CFC). Being a coordinator for the Combined Federal Campaign involves having constant communication with all 12 bureaus within the Treasury for effective planning and designating meetings for CFC. Outside his job at the Treasury, Zackary talked to members of Congress on Capitol Hill on behalf of NMSU International Relations Institute's Immigration Task Force Committee about progressive immigration issues. He also met with Legislative staff and some Congressional members to discuss initiatives and field work being done on immigration issues and how their policies impact communities.

Being able to live five minutes away from the Capitol was the highlight of Zackary's experience. "In my free time I could simply walk into the Library of Congress and read books from hundreds of years ago," he says. "It felt great walking up the U.S. Treasury steps every day, knowing that it is the focal point of all financial stability. Seeing how it operates first hand was absolutely surreal. Having the ability to talk one-on-one to members of Congress about subjects that I understood was incredibly helpful for me to get a clear picture of how

this legislative body operates. Taking time to unwind by sitting next to the Lincoln Memorial was my favorite thing to do."

During his internship, Zackary also studied at Georgetown University, taking 12 credits relating to constitutional interpretation, public policy, and economics. Last year, Zackary was a member of the NMSU Model United Nations team that represented Switzerland in the International Model United Nations conference held in April 2010. The team won Outstanding Delegation and Outstanding Position Paper, and Zackary, along with his team-mate John Martinez, won outstanding delegations for representing Switzerland in the General Assembly Plenary.

Following this success and with the support of his advisor, Dr. Nancy Baker, Zackary became part of the Fund for American Studies, which sponsored his internship at the Treasury Department. The Congressional side of his work was made possible by financial support from NMSU's International Relations Institute. Zackary's experience in Washington has led to a progressive dialog for NMSU and public officials within the State of New Mexico. He was also able to achieve opening dialogue with the Center for American Progress, a major think tank in Washington.

"Zack takes his education seriously," says Dr. Baker. "He is proactive about learning, pushing himself and seeking new opportunities, from the Model UN to this internship."

"I strongly recommend majoring in Government at NMSU, because it gives students courage and strength to face the world and all challenges within it," puts Zackary. "The truism of wanting to help mankind lies within finding one's potential and practicing it with passion. The Government Department helps unearth all forms of potential and teaches how to use it."

For more information about Zackary's internship please contact him at [zackaryquintero@hotmail.com](mailto:zackaryquintero@hotmail.com).

# Guest Scientist from Kenya Strengthens NMSU's International Partnerships in Africa

by Hamid M. Rad, OSI



Photo by Hamid M. Rad, OSI

Mr. Maimbo Malesu describing rainwater harvesting methods used in Kenya.

Mr. Maimbo Malesu, coordinator for the Water Management Unit at the World Agroforestry Centre (ICRAF) in Nairobi, Kenya, visited NMSU last October and lectured for the College of Agricultural, Consumer and Environmental Science's annual Lowenstein Lecture series and the Plant and Environmental Sciences (PES) graduate student seminar. His lectures on overcoming the food crises in Africa and the formation of an irrigation master plan for Rwanda were attended by NMSU faculty, researchers, and students.

Mr. Malesu's collaboration with NMSU is through an MOU between ICRAF and NMSU that was finalized in 2005 by Dr. Mick O'Neill, professor of agronomy at NMSU's Agricultural Science Center, in Farmington.

"The problem water managers are facing in Rwanda is a lack of capacity to harness rainwater and distribute it to farms and industry," says Dr. O'Neill. By participating in seminars and workshops, Mr. Malesu is campaigning to raise awareness and sensitize governments and universities all over the world to the importance of rainwater harvesting management.

He coordinates rainwater harvesting research and dissemination for ICRAF in Eastern and Southern Africa and in South Asia, where he and his team train communities about best practices in water

management, set up pilot projects, and share their experiences with policymakers so they may implement the necessary improvements in the policies they develop. The pilot projects that involve rainwater harvesting and associated irrigation systems have been installed in many regions in Rwanda in collaboration with the Rwandan Ministry of Agriculture and Animal Resources. A previously developed MOU between NMSU and ICRAF contains opportunities for an exchange program, where students and faculty can participate in a range of research activities including efforts to develop more effective water management strategies.

It was through this exchange program that PES student Owen Cortner spent the 2010 summer conducting an evaluation of previously installed runoff harvesting ponds and irrigation systems for agroforestry gardens. Also within this MOU, Dr. O'Neill spent a sabbatical in Nairobi working with Mr. Malesu on an Irrigation Master Plan (IMP) project for the Government of Rwanda. The recommendations of the IMP team were approved by the government of Rwanda in September 2010, and the Prime Minister of Rwanda launched the implementation of the Irrigation Master Plan through the publication of a technical report.

In his lecture on the food crisis in Rwanda, Mr. Malesu highlighted poor agricultural practices prevalent in farming communities. "We found that it is a political issue as well," says Mr. Malesu. "People in that region do not have sufficient economic investment in place despite an abundant water supply. Governments mainly invest in dam construction. The problem with dams is that there cannot be enough of them. Only 5% of the total land mass would provide good locations for the construction of dams. The other option is creating wells, but they are too expensive for farmers to construct."

To promote the practice of rainwater harvesting, Mr. Malesu and his colleagues established the Southern and Eastern Africa Rainwater Network (SearNet), which is a network of national rainwater harvesting associations from 12 African countries. The aim of each association is to promote rainwater

harvesting practices within each country. The mem-

## SearNet Associations

Botswana  
Ethiopia  
Kenya  
Malawi  
Rwanda  
Somalia  
Tanzania  
Uganda  
Zambia  
Zimbabwe

## Affiliations

Eritrea  
Mozambique

bers include government and non-government organizations.

Mr. Malesu's visit and the cooperation from ICRAF showcase the importance of international partnerships for the university. Faculty and students must be engaged in today's world, and opportunities for international education should be further integrated into curriculum and coordinated across departments to maximize benefits.

Mr. Malesu's visit was made possible through the Dr. Lowenstein Lecture Series, International Programs, and the Jose Fernandez Memorial Chair in Crop Production.

For additional information about NMSU's collaboration with ICRAF, contact Dr. O'Neil at [moneill@nmsu.edu](mailto:moneill@nmsu.edu).

## WRRI's New Interim Director

Photo by Hamid M. Rad, OSI



Dr. Sam Fernald, Interim Director of NMSU WRRI speaking on the newly funded research project addressing the conditions of New Mexico acequias.

Dr. Sam Fernald was appointed the interim director of NMSU's Water Research Resources Institute (WRRI). Sam is an associate professor of Watershed Management in the Department of Animal and Range Sciences (College of Agricultural, Consumer, and Environmental Sciences). He has led a number of prestigious research projects including the Acequia Water Systems Linking Culture and Nature: Integrated Analysis of Community Resilience to Climate and Land Use Changes, a \$1.4 million project recently funded by the National Science Foundation.

For additional information about NMSU's WRRI, please visit: <http://wrri.nmsu.edu>. Dr. Fernald can be reached at [afernald@nmsu.edu](mailto:afernald@nmsu.edu).

## *'Meet NMSU's New Biosafety Manager' continued from page 4*

The "Haz Waste" class is required for the person in the lab who is listed on the posted signage as the contact for waste accumulation and disposal procedures. The Blood-Borne Pathogens training, which is currently offered online, is required annually for anyone who has exposure or potential for contact with human blood, internal body fluids, unfixed tissues, or viruses that transmit blood-borne diseases, such as HIV or hepatitis.

Dr. Dupre can help investigators assess safety standards and personnel practices in their labs and work areas, and provide advice on safety regulations and biological laboratory security. "When I survey labs and research areas around campus, I will ask the Principal Investigator and lab workers to show me documentation of personnel training" says Dr. Dupre. "This should be considered as a standard piece of information that a site inspector from a federal agency might request from anyone in the lab area. A good laboratory practice is to ensure documents are kept in an accessible place: training records, standard operating procedures (SOPs) and lab-specific protocols, Emergency Response Plans, log sheets for Incident/Injury/Spills, and sterilization validations. These laboratory standards, policies, and prudent practices have been developed by the scientific community to protect the health and safety of laboratory workers and to prevent adverse impacts on the environment. As a microbiologist, I want to see the names of my colleagues in print for the outstanding quality of their work, not associated with a lab acquired infection." Biosafety resources will be available at Dr. Dupre's office in Anderson Hall, room E2102C, and online at <http://www.research.nmsu.edu/compliance/IBC/ibc.html>.

In the coming months, look for the Biosafety website to become a convenient place to access the NMSU Biosafety Manual, IBC policies and procedures, links to training classes, and FAQs. "As I continue and extend my working relationships with investigators in NMSU research, I am committed to maintaining open communication with faculty, laboratory students, and staff," says Dr. Dupre. "Questions, comments, and suggestions are always welcome. I invite everyone to share my contact information with new personnel in your departments."

For assistance with any biosafety issues, please contact Dr. Dupre at (575) 646-4663.

NMSU Research News is a bimonthly newsletter published by the Office of the Vice President for Research/ Strategic Initiatives. Comments are always appreciated. To submit your research-related news, or to request hard copies, please contact Hamid M. Rad at (575) 646-6429 or via email at [Hamid@NMSU.Edu](mailto:Hamid@NMSU.Edu)

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