Department of Energy Awards $5 Million Grant to Continue NMSU Algal Biofuel Research

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Department of Energy Awards $5 Million Grant to Continue NMSU’s Algal Biofuel Research

By Emily C. Kelley, NMSU News and Media Relations

The U.S. Department of Energy has awarded a $5 million grant to improve algae-based fuel that is compatible with existing refineries to a multi-institutional team led by New Mexico State University.

The principal investigator of the project, entitled REAP: Realization of Algae Potential, is Peter Lammers, director of the NMSU Algal Bioenergy Program. Lammers will coordinate efforts at partner institutions that include Los Alamos, Argonne and Pacific Northwest national laboratories; Washington State and Michigan State universities and four companies, Phycal, Algenol Biofuels, Pan Pacific Technologies and UOP-Honeywell.

Key goals of the 2.5-year project are to improve the yields and stability of algal biomass and cultivation systems while also improving oil content at harvest.

Each of the necessary process elements, or unit operations, required to produce drop-in fuels from algal biomass are targets for improvements by various team members. Strain improvement work will be conducted at Los Alamos National Laboratory, Michigan State University and Phycal; cultivation simulation and validation work will be conducted at Pacific Northwest National Laboratory and NMSU respectively; while bio-crude extraction methods are being developed at Washington State University. Quantitative modeling of the unit operations and integrated processes will occur at Pan Pacific Technologies, Algenol Biofuels and Argonne National Laboratory. Algenol Biofuels also will provide closed cultivation systems that dramatically reduce water losses to evaporation and enhance the stability of algae cultures.

The project reaches across several NMSU departments, including chemical engineering, plant and environmental sciences, fishery and wildlife sciences and the Bio-Security and Food Safety Laboratory. NMSU’s key role will be to integrate all of the unit operations at a single location to demonstrate start-to-finish process compatibility.

The REAP award follows two other federal awards for the NMSU Algal Bioenergy team - Department of Energy funding through the National Alliance for Advanced Biofuels and Bioproducts consortium provides $700,000 over two years for NMSU to support the algal cultivation testbed located at the Fabian Garcia Science Center, and a National Science Foundation EPSCoR award for which NMSU will get $1.5 million over five years for the algal effort.

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NSF MRI Funding to Boost NMSU’s Earth Science Related Research
by Hamid M. Rad, Office of Research Development (ORD)

NMSU’s research in the Earth Sciences is significantly enhanced by a recent NSF Major Research Instrumentation (MRI) award, which has provided funding for acquisition of a Multi-collector Inductively Coupled Mass Spectrometer and a Laser Sampling System.

This effort is led by Dr. Frank Ramos, Associate Professor in the Department of Geological Sciences. A geochemist, Dr. Ramos’ goal is to establish a laboratory facility in which internal and external users can pursue their research goals using innovative techniques involving isotopes.

“The mass spectrometer is designed to measure isotopes of different elements such as strontium (Sr), neodymium (Nd) and lead (Pb),” explains Dr. Ramos. “In the Earth Sciences, these isotopes can be used as tracers to evaluate different reservoirs of the Earth (e.g., mantle and crustal reservoirs) or to date rocks and minerals. In addition, isotopes can be used to track what happens to materials such as magmas, as they move through the earth as well as the time it takes for them to move. These isotopes can also be used to track migration paths of fish, animals, and humans (in addition to many other uses).”

The co-principal investigators on this project are Drs. Nancy McMillan, Geological Sciences; Curtis Monger, Plant and Environmental Sciences; Heather Throop, Biology; and Fumi Arakawa, Anthropology.

In addition to NMSU faculty and students, national and international users in the Earth sciences in fields such as geochemistry, geology, volcanology, and igneous petrology are expected to utilize the lab. Scientists in a range of other fields including soil science, biology, chemistry, archeology, and material science will be able to address research questions using isotopes. “The different uses of the equipment are only limited by the creativity of the scientists that are applying isotopes to address their research questions” says Dr. Ramos.

The initial laboratory setup will occur over three years. In the first year, two different mass spectrometers will be evaluated. One will be purchased and installed. Next, the team will develop techniques for measuring different isotope systems using purified elemental solutions.

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Mosquitoes are a serious threat for human health. They transmit human diseases, including malaria, filariasis, dengue fever, and West Nile virus. Novel mosquito control methods are urgently needed because classic public health insecticides have lost effectiveness due to the development of insecticide resistance within mosquitoes.

To address these concerns, the National Institute of Health has awarded a 4-year, $1,460,000 research grant to Immo Hansen, an Assistant Professor in the Biology Department and a member of NMSU’s Institute of Applied Biosciences. In collaboration with Dmitri Boudko of Rosalind Franklin University; Lawrence Hunter at the University of Colorado, Denver; and Jeffrey Arterburn at NMSU; a group of researchers at NMSU will study how amino acids, obtained from proteins in the blood meals the mosquito takes, are transported and interact with nutrient signaling pathways, which trigger egg production.

“The specific goal of this project is to study two members of a family of nutrient amino acid transporters that mosquitos utilize to move amino acids from one organ to another,” says Dr. Hansen. “An interdisciplinary approach, a combination of molecular biology, biochemistry, organic chemistry, and computational biology, will be used to research how these transporters function, identify potential inhibitors, and discover the intracellular signaling networks they activate.”

The proposed work is significant for human health because amino acid transport inhibitors have the potential to give rise to a new generation of public health insecticides. In addition, this study will expand the knowledge of the functional mechanism of amino acid transport in insects with implications for understanding the basics of essential amino acid transport in humans and other model systems.

For additional information, please contact Dr. Hansen at immoh@nmsu.edu.
Recipients of the 2013 URC Awards for Scholarly and Creative Activities

By Hamid M. Rad, ORD

Dr. Tiziana Giorgi is a Professor of Mathematics at NMSU. Her research interests include nonlinear partial differential equations, applied mathematics, superconductivity, and soft matter systems. She has authored more than 20 journal articles and regularly speaks at international conferences in her area. Dr. Giorgi teaches undergraduate and graduate level courses including Functional Analysis, Measure Theory, Partial Differential Equations and Calculus. A native Italian, Dr. Giorgi earned her bachelor’s degree in Mathematics from the University of Rome - La Sapienza and in 1997 obtained her Ph.D. from Purdue University. She joined NMSU in 2002 and is currently the principal investigator on the NSF-funded project entitled “Investigations of Liquid Crystalline Mesophase Transitions via Landau-de Gennes Phenomenological Models”, which addresses nonlinear problems related to smectic liquid crystalline phase transitions. For more information, please contact Dr. Giorgi at tgiorgi@math.nmsu.edu.

Dr. Bernd Leinauer is a professor in College of Agricultural, Consumer, and Environmental Sciences. An Extension turfgrass specialist, he conducts research that expands into the areas of soil science, soil chemistry, plant physiology, and irrigation technology. Since joining NMSU in 2000, his research has garnered in excess of $1.6 million in federal and industry grants as well as more than $500,000 in unrestricted gifts. He is the co-editor of the book Turfgrass Water Conservation (2nd edition), which covers a wide range of topics on turf including the importance of turf as well as methods on efficient irrigation of turf. Dr. Leinauer received his PhD in Crop Production and Grassland Science from the University of Hohenheim, Stuttgart, Germany, in 1997. Prior to joining NMSU he worked as a research associate at Michigan State University. Dr. Leinauer can be reached at leinauer@ad.nmsu.edu.

Dr. Pierre Wilbert Orelus is an Assistant Professor in College of Education’s Department of Curriculum and Instruction. He has coordinated and co-coordinated the Bilingual and TESOL programs for over two years and teaches courses on pedagogy of TESOL, second language acquisition, and acquiring emancipatory discourses. Dr. Orelus’s research foci include the politics of language, race, gender, and cultural

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The NMSU High-Energy Nuclear Physics Group, led by Drs. Stephen Pate and Vassili Papavassiliou, has joined a unique effort at Fermi National Accelerator Laboratory to study the properties of ghostly particles called neutrinos and their interactions with atomic nuclei. The new experiment at Fermilab is called MicroBooNE; it will consist of a 170-ton vessel of liquid argon containing a special detector called a Time Projection Chamber. A beam of neutrinos from the Fermilab Booster will pass through the tank of liquid argon; if a neutrino interacts with one of the argon nuclei, then the Time Projection Chamber will record the outcome.

Neutrinos are one of the fundamental particles of physics, but they do not interact with normal matter very much. The sun produces a tremendous number of neutrinos as a result of the conversion of hydrogen nuclei into helium, and the vast majority of these neutrinos pass out of the solar system (that means passing through you and me and the earth) without interacting at all. Seventy million solar neutrinos are passing through the tip of your thumb every second! So, in order to study the properties of neutrinos in the laboratory, it is necessary to produce a very large number of them in a beam and pass them through a large thick target that also functions as a detector. The MicroBooNE Liquid Argon Time Projection Chamber is the target/detector system that the NMSU group is working on.

Physicists are still asking basic questions about neutrinos: How many kinds of them exist? What are their masses? The most intri-
guing property of neutrinos is that they can change from one kind into another; this is called "neutrino mixing" or "oscillations." For many years, this idea was only a speculation, but in the last 10 years it has been established that neutrino mixing is a reality. The MicroBooNE experiment will investigate the details of neutrino mixing and deduce the masses.

The NMSU group has special interest in the MicroBooNE experiment because it allows the investigation of how neutrinos interact with atomic nuclei. In particular, it will be possible to observe the elastic scattering of a neutrino from a proton residing in the argon nucleus. The rate at which these events occur can be used to extract the properties of the up, down, and strange quarks inside the proton; these properties are central to the research theme of the NMSU group.

Because the interaction of the neutrinos from the Fermilab beam with the MicroBooNE detector is relatively rare, there are many other "background" processes that physicists must consider when using the detector. One of these is the interaction of cosmic-ray muons with the detector. There are many high-energy particles in space, and when these particles crash into the upper atmosphere of the earth, a shower of secondary particles is produced; many of them are so-called "muons" that can reach the surface of the earth. (While you have been reading this article, many hundreds of these muons have passed through you!) The NMSU group has built a small detector system to independently observe these muons in the MicroBooNE experimental area at Fermilab, and this summer it was installed and put into operation.

NMSU has a long history of collaboration with Fermilab and is a member of Universities Research Association, a consortium of 86 research universities from around the world and one of the operators of Fermilab. One of the benefits of membership is eligibility to apply for the URA Visiting Scholars Program; Drs. Pate and Papavassiliou expect to take advantage of this program in the next few years in order to work more closely on the MicroBooNE experiment.

Additional information about the MicroBooNE Experiment can be found at http://www-microboone.fnal.gov; you may also contact Dr. Stephen Pate at pate@nmsu.edu.

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**NMSU Chemistry and Biochemistry Faculty Awarded Prestigious NIH R01 Grant**

Dr. Shelley L. Lusetti, an Associate Professor of Chemistry and Biochemistry, was awarded a prestigious grant by National Institutes of Health (NIH) to continue her research on the process of DNA repair.

Genetic alterations to an organism's DNA may lead to gross chromosomal instability that can cause birth defects, cancer, and premature aging. These alterations can result from improperly repaired DNA double-stranded breaks. The process of accurate DNA repair requires many enzymes involved in DNA replication and recombination. One such class of proteins important to chromosome stability is the Structural Maintenance of Chromosomes (SMC) family of proteins. SMC proteins have essential (although not fully understood) house keeping and tumor suppressor roles in a variety of DNA metabolic processes such as chromosomal condensation, sister chromatid cohesion and recombinational DNA repair.

Dr. Lusetti was recently awarded a 5-year, $1.3 million R01 grant from the National Institute of General Medical Sciences within the NIH to define the biochemical role of SMC-like proteins in the repair of DNA double-strand breaks. For additional information about this project, please send email to slusetti@nmsu.edu.
NMSU CHSS Associate Dean for Research Launches the Newly Established Southwest Survey Research Center

By Hamid M. Rad, ORD

The Office of the Vice President for Research is delighted to welcome Dr. Joe Tomaka, the new Associate Dean for Research for the College of Health and Social Services. His areas of research include stress and coping with an emphasis on threat and challenge reactions to stress, the use of brief interventions to reduce risks associated with hazardous alcohol consumption, and issues related to weight management including participation in physical activity and assessment of weight management practices.

Can you tell us about your previous work before you joined NMSU?
Prior to joining NMSU, I was an Associate Professor of Public Health Sciences at the University of Texas at El Paso (UTEP). I also served as the Associate Dean of the College of Health Sciences from 2005 to 2007.

What are your goals for the College of Health and Social Sciences?
My general goals are twofold. The first is to increase the research productivity of the College of Health and Social Services. Research productivity is defined by a number of metrics including the number of faculty who are actively engaged in research, the number of publications by faculty in peer reviewed sources, the number of grant proposals submitted by College faculty, the number awards received by the faculty, and the total amount of funding received from these awards.

The second is to launch the operational phase of the Southwest Survey Research Center. We are very eager to begin the operational phase of the newly-established Southwest Survey Research Center (SSRC). The center has been developed over the last two years and is designed to assist researchers, agency directors, business leaders, and policy makers in all aspects of survey research. The SSRC is housed in the College of Health and Human Services and under my direction. The Center has state-of-the-art hardware and software for conducting phone and internet surveys of any type and length. The center also has facilities for conducting face-to-face interviews and focus groups.

The SSRC provides a wide array of services, including
- Research design (sampling design and procedures), questionnaire and survey design
- Mail, telephone, web and in-person surveys
- Focus group design and conduction
- Data collection and management
- Data entry and coding
- Statistical analysis
- Table and graph design
- Presentation of results
- Data archiving and secondary analysis services
- Bilingual (English/Spanish) translation services

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PROPOSAL DEVELOPMENT WORKSHOPS
OFFICE OF RESEARCH DEVELOPMENT

STRATEGIES FOR DEVELOPING COMPETITIVE PROPOSALS

Don’t know where to start when responding to a funding agency’s request for proposal (RFP) or how to decipher the requirements? Ever gotten review comments from your proposal that made you believe the reviewers didn’t understand or maybe even read what you wrote in your proposal? Or been told by the reviewers that your proposal contains good ideas, but was not a good “fit” for funding? This 2 ½ hour workshop is meant for beginners and those with some experience in writing proposals, irrespective of the discipline. It will explore best strategies to respond to a funding agency’s request for proposal and includes how to analyze an RFP, how to plan your proposal development, how to contact the Program Officer, how to write a competitive proposal, how to make your proposal easy to read for reviewers.

Date: Tuesday, September 17, 2013
Time: 1:30 PM - 4:00 PM

Date: Friday, October 4, 2013
Time: 9:30 AM - 12:00 noon

WRITING COMPETITIVE NSF PROPOSALS

The National Science Foundation (NSF) promotes the progress of science and advances the national health, prosperity, and welfare with an annual budget of more than $7 billion. NSF is the funding source for approximately 20% of all federally supported basic research conducted by America's colleges and universities. So, how do you get started? This 2-hour workshop will address NSF strategic goals, NSF directorates, what is included in a typical NSF proposal, what NSF reviewers look for in your proposal, and what to consider when developing a Broader Impacts section.

Date: Tuesday, September 24, 2013
Time: 2:00 PM - 4:00 PM

Date: Friday, October 11, 2013
Time: 9:00 AM - 11:00 AM

REGISTRATION: For more information or to register for a workshop please visit http://grid.research.nmsu.edu/workshops_list.php

LOCATION: The above ORD workshops will be held in Anderson Hall. As Anderson Hall is a secure facility, participants will be asked to show a picture ID, sign in and receive a Visitors Pass at the front desk. You will be escorted to the workshop conference room.
GRID’s New Features Enhance User Experience

Hamid M. Rad, ORD

Just in time for the start of the fall semester, the Office of Research Development (ORD) is releasing a new version of the Grants and Research Information Database (GRID; grid.research.nmsu.edu/grid) that boasts enhanced features in addition to a new look and feel. Users can now login using their myNMSU username and password and take advantage of the collaboration tool linked with each funding opportunity to express interest and communicate with colleagues.

Developed by ORD, GRID is an interactive, online database and portal that provides NMSU faculty and staff resources for pursuing extramural funding. Features include

**Researcher Profiles:** Searching for collaborators with particular expertise or capabilities? This section allows you to search for NMSU researchers with expertise in the fields in which you are interested.

**External Funding Opportunities:** Seeking additional funding? The External Funding section contains opportunities posted on major government websites and includes only opportunities for which the NMSU community is eligible to pursue.

**Workshops:** Looking for techniques and strategies to help you improve your proposal development skills? Visit this section to view upcoming ORD workshops that target novice through advanced proposal writers.

**Resources:** Want to learn more about what specific funders are looking for in your proposal? This section contains grant writing tips, proposal guides, information about the review process, and other useful documents from NIH, NSF, and others.

For additional information, please contact the ORD director, Dr. Sudha Murthy, at smurthy@nmsu.edu.

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To read more about NMSU’s algal biofuels research and view photos of the algae cultivation testbed, visit http://research.nmsu.edu/erl/algalbiofuels/testbed/.
“NMSU CHSS Associate Dean Launches the Newly Established Southwest Survey Research Center” continued from page 8

I believe that this center will become a real asset to researchers at NMSU and to the region as a whole.

Are you going to continue your own research?
Yes. I have a longstanding interest and publication record in stress and coping. In the past 7-8 years, I have also cultivated a program of research on alcohol misuse generally, and use of brief intervention techniques to reduce risks associated with excessive drinking. My future plans are to continue research in these areas and, of course, their intersection. I have particular interest in seeking NIH funding to examine, in a large-scale trial, how the addition of stress and coping information can increase the effectiveness of social-norming-based Personalized Normative Feedback interventions along the lines of the project described above. This and future projects will examine how individual differences in threat and challenge contribute to these processes and health outcomes generally.

Do you have any message to NMSU faculty?
I am thrilled to be at NMSU and folks in the College are very eager to collaborate with our friends in departments across the University. Please don’t hesitate to contact me if you have research proposal related to health.
Dr. Tomaka can be reached at tomaka@nmsu.edu.

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while also evaluating laser sampling systems. By 2015, technique development will focus on laser-accompanied analyses to measure isotopes in a range of natural materials including rocks and minerals, bypassing the need for time consuming sample preparation and purification.

The total cost for this project amounts to $700,000. In addition to the $500,000 NSF MRI award, acquisition of this equipment was made possible by a $210,000 match made by the Office of the Vice President for Research and the College of Arts and Sciences. NMSU alumni Michael and Judy Johnson will also provide $300,000 to the team for additional machine upgrades and the purchase of the laser sampling system. For additional information contact Dr. Ramos at framos@nmsu.edu.

“Recipients of the 2013 URC Awards” continued from page 5

studies; post-colonial and immigrant/transnational studies, bi-literacy; and critical pedagogy. He has authored and contributed to a number of scholarly books and journal articles. For his book, The Agony of Masculinity, Dr. Orelus was praised as an “intellectual freedom fighter” by American academic and activist Cornel West. He is currently the co-chair of the Paulo Freire special interest group (SIG) and the past chair of the Post-colonial and Education SIG at American Educational Research Association. Dr. Orelus is a poet and earned in Ed.D. in Language, Literacy, and Culture from the University of Massachusetts at Amherst in 2008. For additional information please contact him at porelus@nmsu.edu.

Assistant Professor of Electrical and Computer Engineering, Dr. Wenxin Liu teaches Power System Stability and Transients, Power Systems III, and Power Network Modeling and Computation. His research interests include intelligent control of power systems, control and optimization of microgrids, computational intelligence, and Fault detection and diagnosis. Since joining NMSU he has led several funded projects including BRIGE: A Novel Stable Dully Distributed Energy Management Solution for Microgrids, funded by the National Science Foundation; Cooperative Optimization and Control for Better Pulsed Power Loads Accommodation, funded by the Office of Naval Research; and Experimental Platform for Novel Distributed Microgrids Control Solutions, also funded by the Office of Naval Research. Dr. Liu earned his PhD in Electrical Engineering from the Missouri University of Science and Technology in 2005 and is a member of the Institute of Electrical and Electronic Engineers. He can be reached at wliu@nmsu.edu.