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NMSU Delegation Participates in 2010 International Conference on Biomass and Energy Technologies in China

NMSU’s Dr. Vimal Chaitanya, Vice President for Research, Dr. Shuguang Deng, professor of Chemical Engineering, and Dr. Khandan, professor of Civil Engineering, along with four of his graduate students attended the 2010 International Conference on Biomass and Energy Technologies in Beijing, China. The team delivered a plenary lecture, two keynote addresses and several presentations on NMSU’s algal biofuels efforts as follows:

**Algal Biofuels: Global Promise and Prospect**  
Vimal Chaitanya (Plenary Lecture)

**Microalgae as a Sustainable Source of Energy**  
Nirmala Khandan (Keynote address)

**Direct Conversion of Wet Algae to Biodiesel under Supercritical Methanol Conditions**  
Shuguang Deng (Keynote address)

**Air-lift Driven Raceway Bioreactor for Microalgae Production**  
B. Ketheesan, graduate student, Civil Engineering

**Optimization of Algal Photobioreactor for Biodiesel Production**  
A. K. Pegallapati, graduate student, Civil Engineering

Feasibility of Biohydrogen Production from Particulate Waste Biomass  
K.R.J. Perera, graduate student, Civil Engineering

Bioelectricity Production from Waste Biomass  
Y. Arudchelvam, graduate student, Civil Engineering

In addition to participation in the conference, the NMSU delegation visited Beijing University of Chemical Technology (BUCT) and met with its vice president, Mr. Xiangyang Li, Dean of the College of Life Science and Technology, Dr. Qipeng Yuan, and several other professors from the college.

Drs. Chaitanya and Deng also visited the East China University of Science and Technology (ECUST), where they were welcomed by Professor Shandong Tu, VP for Research of that university, took a tour of their school of Chemical Engineering, and met with faculty members.

During these visits, the NMSU delegation discussed potential collaborations on joined undergraduate and graduate programs between ECUST, BUCT, and NMSU.
NMSU's Core University Research Resources Laboratory Supports Regional Collaborative Research and Exploration  

By Hamid M. Rad, OSI

NMSU is now equipped with a new Laser Scanning Confocal Microscope, the Leica TCS SP5, a state-of-the-art instrument that has several advanced features directly relevant to research underway at NMSU. The instrument is housed in the Core University Research Resources Lab (CURRL), NMSU’s centralized microscopy facility located in Skeen Hall and administered by the Office of the Vice President for Research. This new instrument will help improve current and future research and training, creating a comprehensive core facility to serve the university and surrounding community.

“The major capabilities include a set of five lasers, producing eight laser lines ranging from ultraviolet to red, to excite fluorescence from a broad range of fluorescent probes that can be combined into complex images containing quantitative information,” says Dr. Peter Cooke, Director of CURRL. “A precision scanning sample stage permits rapid three-dimensional (3-D) imaging. The optical components provide very high selectivity and sensitivity, and programmed operations execute sequential steps to measure dynamic properties providing information about molecular diffusion and microscale viscosity, among other parameters.”

Acquisition of this instrument is the result of the efforts by Dr. Jennifer Curtiss, Principal Investigator and Assistant Professor of Biology, and other faculty members from various departments in the Arts & Sciences and Agricultural, Consumer and Environmental Sciences Colleges to secure the funding for the purchase of this instrument from the National Science Foundation. Co-Investigators include Dr. Peter Cooke and Drs. Charles Shuster, Michele Nishiguchi and Elba Serrano from the Department of Biology. “There are no confocal microscopes comparable to the Leica TCS SP5 in the area” says Dr. Curtiss. “This system not only accommodates the diversity of research applications at NMSU, but also represents a unique resource for other institutions in southern New Mexico and western Texas, and efforts are being made to identify and recruit new users within the region.”

Researchers in virtually every natural and applied science can benefit from applications of this microscope to their investigations as a tool of discovery and experimental analysis. “Physicists can measure particle sizes, shapes and arrangements, as well as nanometer scale features on surfaces in 3-D reconstructions,” says Dr. Cooke. “Using the microscope as an imaging spectrometer, chemists can measure fluorescent properties of solvents and solutes, as well as polymers during processing on a microscale. Biologists similarly are able to take advantage of the microscale 3-D imaging capabilities to measure the dynamic organization of living cells, tissues, and small organisms to gain insights into complex biological mechanisms.”

This instrument is also providing a more advanced training environment for NMSU students. The researchers will use this microscope to mentor more than 100 graduate and undergraduate students. “The opportunity for students to use state-of-the-art fluorescent imaging and analytical tools will profoundly impact their research projects, making them more competitive in gaining entry to top graduate programs or obtaining top postdoctoral positions,” suggests Dr. Curtiss.

For additional information about CURRL visit http://research.nmsu.edu/currl

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NMSU was recently awarded $300,000 from the National Institutes of Health (NIH)’s Academic Research Enhancement Award (AREA) Grants - (R15) funds to develop a new bioprocess sensing technology to enhance biomedical research and training at NMSU. The Principal Investigator of this project is Dr. Jessica Houston, faculty in the Department of Chemical Engineering.

Please tell our readers about your academic background.

I graduated from NMSU’s Chemical Engineering program in 2000 and then attended graduate school at Texas A&M University. I received my Ph.D., also in chemical engineering, from Texas A&M in 2005 and was a Director’s Postdoctoral Fellow at Los Alamos National Laboratory for three years before coming back to NMSU.

What are your research interests?

My research is in the area of bioengineering, specifically biophotonics and flow cytometry. I was trained in a traditional chemical engineering department; however, my graduate research was very multidisciplinary. I studied an optical imaging technique called Frequency Domain Photon Migration. We developed diagnostic imaging systems for breast cancer detection and lymph node staging. As a postdoc, I shifted gears a bit and studied frequency domain flow cytometry and fluorescence lifetime applications. Thus, I was able to broaden my expertise in a bioengineering field that also slightly complemented my graduate training.

Please tell us about your recent NIH funding.

My NIH R15 EB012013 is a two-year project on the development of a technique that I call Excited State Flow Cytometry. The grant funds key and promising ways for improving how individual cells flowing through a laser beam are optically counted, analyzed, and detected. More specifically, our lab is trying to expand the way in which cytometrists handle common sources of noise in cellular measurements, namely autofluorescence. Also we are utilizing a distinct photo-physical trait, the relaxation time of an excited species, to better enrich populations of cells expressing fluorescent proteins (e.g. Green Fluorescent Protein).

What issues does it address?

Flow cytometry is widely used by doctors, clinicians, scientists, researchers, or anyone interested in exploring a variety of phenomena in cells on a high throughput cell-to-cell basis. This almost 40-year old technique is somewhat similar to studying cells under a fluorescence microscope; however, it requires that cells in a solution literally flow in order to be optically scanned with a laser light source. Our research addresses the fundamental way in which cells in-flow are measured. Rather than looking at the brightness of an optically emitted signal, we look at the time in which the excited species decay to ground. This allows a cytometrist to address fundamental issues that are related to the inability to otherwise separate signals based on intensity and spectral overlap.

What is the overall impact of this project?

This work has enormous potential to translate commercially into the large market of traditional flow techniques.
cytometry technologies. With the ability to measure a fluorophore’s excited state, many cytometrists could garner additional information and have the power to look for rare cellular events, as well as separate optical signals from each other. If it is indeed transformative, it may potentially impact the worldwide flow cytometry community. Within New Mexico, this technology is particularly important because it fosters a continued relationship between our research at NMSU and ongoing cytometry efforts at Los Alamos National Laboratory, where flow cytometry, in part, originated. It also supports work performed at the University of New Mexico, where I have collaborators in this field.

What is the impact of this project on NMSU?

My goal is for this project to develop into future proposal opportunities for funding that would support additional graduate students and postdocs at NMSU. This R15 is a nice jump-start to my research program; I have high hopes for providing high-quality bioengineering research opportunities for our undergraduates as well.

Are other faculty members involved in this project? If so what are their roles?

I am the only PI on this project; however, there are other significant contributors, including Dr. James P. Freyer, University of New Mexico, Mark Naivar, Darkling Simulations, and Dr. Andrew Bradbury, Los Alamos National Laboratory.

Do students work on this research too?

Yes. Thus far, I have recruited and hired three undergraduate research assistants, who worked during the summer, and a Master’s student, Patrick Jenkins.

What are your students’ roles?

Patrick is leading the instrumentation development and my undergraduates are tasked with preparing cell and microsphere samples for testing on the instrument.

Dr. Houston joined NMSU in 2009 and teaches CHE 111, Introduction to Computer Calculations in Chemical Engineering, and CHE 305, Transport Operations I: Fluid Flow. She can be reached at jph@ad.nmsu.edu.
Mexico continues to be on the U.S. Department of State’s list of most dangerous countries in which to travel. News about gruesome killings and bodies of innocent civilians discovered haunts the air and the Internet on a daily basis. One wonders when there will be an end to all these crimes. Is anyone even keeping track of all these murders? The answer is, ‘Yes’. Molly Molloy, an instructor and librarian with the NMSU Library, maintains an online news service that documents violence and murders in Mexico, particularly Ciudad Juárez, and her work has been featured in numerous national and international news outlets during the past year.

When did you start documenting violence and killings in Mexico?

Sharing information on immigration, security, environment, human rights, trade, and other issues has always been a part of my work as a specialist in border issues. The original Frontera List was an email listserv that was started by a group of academics, journalists and activists interested in U.S.-Mexico border issues back in about 1996 and for several years I hosted the list here at NMSU. At that time, there were a few dozen subscribers. In 2004, I converted the list from an internet-hosted listserv to my own gmail account. In early 2008, I began to document the explosion of violence in Ciudad Juárez—in 2007, there were a total of about 300 murders in the city; by the end of 2008, there had been 1,623 and since then, the numbers have continued to increase. A part of this documentary record from early 2008 is included in the new book, Murder City: Ciudad Juárez and the Global Economy’s New Killing Fields, by Charles Bowden (Nation Books, 2010). In August 2009, I converted the list to the Google Newsgroup format and today, there are about 520 subscribers to the group. Membership has grown considerably since being written about in the Wall Street Journal earlier this summer: http://online.wsj.com/article/SB10001424052748703685404575306791446373462.html

How do you collect your information?

I get most of the information on the killings in Juárez from the online versions of El Diario de Juárez and Norte de Ciudad Juárez. I look at Mexican national sources like El Universal, Milenio, Proceso, La Jornada and others. I also check websites including Lapolaka.com and ArrobaJuárez.com. I have several Google alerts for Juárez news and get postings from the mainstream press and a lot of blogs and websites. I also supplement the daily collection of current articles with archival information stored in the Informacion Procesada (INPRO) database of Chihuahua news sources that the Library subscribes to http://www3.inpro.com.mx. This is a unique resource and the only database for archival access to the Mexican press in this region. Also, there are reporters from the Wall Street Journal, Los Angeles Times, Washington Post, New York Times, Reuters, Associated Press, NPR, El Paso Times and various regional TV stations on the list. They will often let
me know when they have a new story. I have contacts with several Juárez reporters and photojournalists who will point me to stories that I have missed, and they are also helpful when I need other sources for current statistics or follow up on certain stories. There are also quite a few activists and academics on the list and they will send press releases or links to new publications. It is a real hodgepodge of sources.

What do you hope to accomplish through this source of information?

I think the Frontera List raises awareness of the day-to-day realities of violence in Juárez. When you see or read about even the most basic details of the murder victims, it makes it much more difficult to believe the rhetoric of both Mexican and U.S. government officials when they say that “90% of the victims are criminals being killed by other criminals.” President Calderon has said this explicitly and it has been echoed by his security officials, by both the U.S. and Mexican Ambassadors and by various members of the current U.S. Administration, including Secretary of State, Hillary Clinton.

There are quite a few reporters and editors on the list and I have noticed that the updated numbers I try to post daily on the murder toll in Juárez do appear in the English-language press more frequently than in the past. I still see huge underestimates of the deaths, but I am pretty confident of my tally and when there are new official reports in the Mexican press, they are almost always larger than what I have recorded on a day-to-day basis. So, when/if I complain about undercounts in the U.S. press, I think I’m right.

I also use the list as a “proto-archive,” a place to store thousands of original articles that document this time-period in Juárez and in other places in Mexico and the border region. I’m working with a programmer/analyst here at NMSU’s ICT to develop these archived articles into a real database that will allow us to find out more about the characteristics of the victims (age, gender, circumstances of the murders, etc.) This information will be an important piece of the record of what happened.

How can people access the information you collect?

The Google group archives are available to any subscriber to the list at this web address: http://groups.google.com/group/frontera-list. At this point the bulk of the information is stored in my own email archives and I’m working with Matyas Danter at ICT to develop a way to export and organize the information into what I hope will be a public database. We just started working on this in early August, but we have made a lot of progress. My long-term plan is to include this digital archive as a part of a larger Border Archives and Special Collections project here in the NMSU Library. This is a project we began in 2008.

Have you ever received recognition for your work?


Who is funding your efforts?

At this point I would have to say that the NMSU Library is funding these efforts because they pay my salary, but I have not yet obtained any funding for the Frontera List. My department head, Cynthia Pierard, and my colleagues in the department are very supportive. The larger project of the Border Archive and Special Collections is supported by the Library, and we have secured a small amount of private funding for other efforts centered on digitizing materials in the Esther Chavez Cano Collection. http://lib.nmsu.edu/exhibits/chavezcano

I see this collection as the seed of the larger border archive project and the Frontera List is another aspect of the project.

Would additional funding make any difference in your work?

YES! Along with my colleagues in Archives, Steve Hussman and Charles Stanford, Jeannette Smith, and in the Development Office, Kristina Martinez, we have written several proposals and are working on a more extensive fundraising effort. I am also working with Sheila Black and Rebecca Sellar from the University Development Office to apply for external funding. In October 2008 and again in 2009, we presented our proposal for a Border Archive and Special Collection as part of the University’s Federal Initiatives program, but the project was not selected. I will be glad to provide more information on that proposal and will certainly participate again this fall.

The work of creating the database will require a lot of data analysis and I’ll need help to read and process all of the information stored in the articles. I hope to recruit a bilingual graduate student interested in border issues to work with me on this and of course, we will need real funding to make this happen. I’m open to any and all suggestions!

What is your message to NMSU faculty, researchers, and students?

There are more Mexican people from Juárez and other places in northern Mexico who have moved here to seek refuge from the violence. Some are openly seeking political asylum, but many more are living here under the radar and under the border patrol checkpoints, trying to make a living and take care of their families. Many people with family and professional ties to Juárez no longer go there. It is no longer possible to take student groups to Juárez, nor will area universities sponsor or even allow professional travel to Juárez.

My current work is a daily task that I fear will never end

Continued on page 9
A group of scientists from NMSU and UTEP have completed the second year of a three-year NSF-funded project to investigate the tectonic process of subduction. The PI’s on this grant are Dr. Jeff Amato, an associate professor at NMSU, and Dr. Terry Pavlis, a professor at UTEP.

Subduction zones, such as the Aleutian Trench in Alaska, are where oceanic plates descend into the Earth, resulting in earthquakes and volcanism. As the plate enters the trench, any sediment on top of the plate is typically scraped off and becomes part of the overlying crust, a process called subduction accretion. Sometimes this sediment is subducted with the plate, a process called subduction erosion. Today, this is happening in various locations but occurs below sea level. In southern Alaska near Anchorage, an ancient subduction zone ranging from 60-200 million years old, is exposed on land, allowing for detailed study of these processes. The sediment scraped off in this location forms the Chugach Terrane. Zircon minerals in this sediment were collected across a 15 km long transect and radiometrically dated using uranium-lead isotopes. They found that the ages fall into two groups: Some that indicate deposition around 150 million years ago, and others that were much younger, around 90 million years ago. The gap between these two ages was interpreted as indicating a period of subduction erosion. This may have been triggered by the subduction of an oceanic magmatic ridge, or spreading center, around 120 million years ago. This research of ancient subduction zones is significant because it will help understand the active subduction zones that cause many of the world’s most damaging natural disasters such as earthquakes and volcanic eruptions.

In addition to the PI’s, two master’s degree students in the Department of Geological Sciences are involved in the research. Caleb Worthman (B.S., U. Mass Amherst, 2009) and Evan Kochelek (B.S., Trinity University, 2009) both presented their results at the Geological Society of America conference in Anaheim in May, 2010. Evan recently was awarded an $1800 Research Grant from the Geological Society of America, as well as a Merit-Based Enhancement Fellowship for the 2010-2011 academic year from the NMSU Graduate School. An undergraduate Geological Sciences major, Joe Hecker, is also part of the research team. All three students conducted field work in the Anchorage, Alaska, area this summer, which involved hiking and kayaking to collect geochronology samples, sometimes in the company of bears. Some of the results of this study were published in the journal *Geology* this spring (Amato, J. M., and Pavlis, T. L., 2010, Detrital Zircon Ages from the McHugh Complex, Chugach Terrane, Southern Alaska, Reveal Multiple Episodes of Subduction Accretion and Erosion, *Geology*, 38, 459-462, doi: 10.1130/G30719.1).
The Soil, Water, and Agricultural Testing (SWAT) Lab at NMSU has passed its biennial accreditation audit with flying colors. Every two years, the American Association for Laboratory Accreditation reviews the SWAT Executive Management and Quality Assurance Systems for adherence to both national and international standards.

SWAT began as a soil and plant testing lab in 1974. From 1974 to 1994, the lab’s technicians provided support to researchers and the public by performing chemical analyses upon request. Beginning in 1994, SWAT worked with the New Mexico Environment Department (NM ED) to provide testing services for drinking water supplied to communities throughout New Mexico. The lab must meet stringent quality assurance and control requirements set by the U.S. Environmental Protection Agency and the NM ED to perform these analyses. Biennial audits by A2LA provide the required evidence of SWAT’s management and quality systems.

Our commitment to quality is top priority. Analysts at the lab undergo quarterly evaluations using double blind samples to evaluate their capabilities and to verify the effectiveness of our quality assurance protocols. Using the results of these tests and through onsite visits, the A2LA evaluates our commitment to quality and verifies that SWAT meets the requirements of the International Standards Organization (ISO) 17025 for environmental testing.

The most recent audit was the best in 16 years of external evaluations. In addition to meeting the ISO 17025 requirements, SWAT was also evaluated using the National Environmental Laboratory Accreditation Conference (NELAC) requirements. Following the A2LA review, SWAT was granted accreditation as an environmental testing lab for the next two years, and is the only internationally accredited environmental testing lab in New Mexico. Accreditation to the ISO standard means SWAT is able to test samples for any entity around the world that recognizes the high level of quality of ISO accredited laboratories.

Some will ask, who or what is the SWAT Lab? The SWAT Lab is a self-supporting division of the Plant and Environmental Sciences Department in the College of Agricultural, Consumer, and Environmental Sciences. The lab has been testing environmental materials for a wide range of both public and private clients for nearly four decades. SWAT has the capacity to analyze soil samples from farms to home gardens, environmental samples from wastewater to dairy sludge, plant samples for nutrition evaluations, drinking water, irrigation water, and provides researchers with a wide range chemical testing services. The lab also provides basic microbial testing for drinking water and surface water samples.

In addition to highly trained, degree holding specialists, SWAT Lab employs student assistants who receive financial support through their work and who gain valuable training. Our analysts are: Barbara Hunter, Cindy Waddell, Sharon Smith, Alex Chidester, Jim Dunn, and Dr. Saeed Shojaee. Cecilia Marquez and Celia Salinas provide office support. Andrew Bristol provides QA/QC services. NMSU is proud of the SWAT lab’s performance.

Dr. Bill Boyle can be reached at wboyle@taipan.nmsu.edu.

NMSU Librarian Documents Violence …” continues

and yet, I think the work is important because there must be a record of this time, a record that is factual, that is preserved for future researchers. I have the intention of organizing this digital archive into a database that will help to answer questions for future researchers. Doing this every day, I start to see patterns, for instance, the month of August has seen the highest number of murders of any month of the year in both 2008 (228) and 2009 (316). Based on the death toll as of August 24, 2010 of about 253, it is possible that this month will set another terrible record.

Some people insist that my focus on the numbers denies the humanity of the victims and of those working for social change in Juárez. I disagree. The actual victims of the slaughter happening in Juárez disappear in the pages of commentary and policy analysis from government, academic and law enforcement experts in both the United States and Mexico. Poets and critics say that perhaps “Juárez has become a metaphor, an emblem of the future of the U.S.-Mexico border…” [Juárez is dying, prominent journalist warns. El Paso Times, April 10, 2010.]

But Juárez is not a metaphor. It is a real place of great neglect and great suffering. It is a place where gangs of killers—organized and otherwise—commit murder with no fear of punishment. It is a place where the citizens can expect no protection from their government leaders or from their institutions.

My job is easy compared to the Mexican journalists in Juárez and elsewhere who risk their lives every day to gather facts and tell these stories. If these efforts help to open eyes to a human rights disaster on our border, then I feel I am doing my job.

Ms. Molloy is a Border & Latin American Studies Specialist at the University Library. She joined NMSU in 1992 and currently serves in the Reference & Research Services Department. For additional information about her work please contact her at: mollymolloy@gmail.com.
Owen Cortner, an NMSU Plant and Environmental Sciences major, spent this summer working on an internship in Africa. Through an agreement between NMSU and the World Agroforestry Centre (WAC), Owen was hosted by the WAC as an attached undergraduate student. The Centre, one of fifteen institutions around the world that make up the Consultative Group on International Agricultural Research, works to develop more productive, diversified, integrated, and intensified agroforestry systems that provide livelihood and environmental benefits. A key element within this goal is smart water management.

Owen’s assignment in Rwanda was to conduct a rapid assessment of runoff harvesting pond irrigation systems for small farmers engaged in agroforestry and determine strategies for improvement. Preliminary findings of Mr. Cortner’s study indicate that inefficient hand-watering techniques are widespread due to a lack of capital to invest in metered systems such as drip irrigation. “There are efficient low-cost irrigation methods available which farmers could be educated about,” says Owen. “The runoff harvesting ponds themselves work very well, but the amount of water stored by the ponds is often not matched to the size of the plot that is intended to receive irrigation, resulting in water deficits for crops towards the end of the dry season. There is a great opportunity to address these and other small holder agricultural issues through improved extension efforts and farmer capacity building.”

To analyze the runoff harvesting ponds the team used two strategies: on-site observations and geographic information system (GIS) data including soil type, watershed delineations, rainfall, land cover, and temperature. On-site observations gave an idea of the experience the farmers had using the system and their perceptions of the system. GIS analysis showed what potential water harvests could be, and the amount of water a farm would need given its location and cropping system.

This internship was funded by a linkages grant from USAID via the World Agroforestry Centre, as well as support from Aggies Go Global. This combined assistance covered Owen’s work-related living expenses in Rwanda.

Professor Maimbo Malesu, director of the
Watershed Management Program at the WAC, and Dr. Mick O’Neill, Jose Fernandez Memorial Chair in Crop Production at NMSU, jointly supervised the internship. Work was performed collaboratively with a dedicated group of Kenyan and Rwandan agroforestry professionals.

“A foreign student in Rwanda faces many challenges including cultural differences such as cuisine and the slower pace of life, although eventually these turn into enjoyable aspects,” says Owen. “Also, though it is a pleasant, friendly country, it is not the developed world, and students should not expect the ubiquitous conveniences of life in the United States.”

Asked for his advice to other students, Owen suggests that they should work diligently to engage the community around them so that they have a sense of belonging and purpose. “I recommend that students with the drive to succeed and the will to be humble in a foreign culture pursue internships, service-learning experiences, or any other international opportunity they can find,” adds Owen. “It is invaluable as a complement to a student’s education. I would take a job in Africa tomorrow if I was finished with my degree, and I plan to do just that once I graduate.”

“NMSU and WAC are looking at future possibilities for student attachments as part of the existing agreement,” says Dr. O’Neill. Professor Malesu will be on campus in October to meet with students and faculty and to present two guest lectures. These lectures will be a follow-up to a seminar to be presented by Cortner to the Plant and Environmental Sciences Graduate Student Seminar, at 3:30 on October 8, 2010.

For further information, contact Dr. O’Neill, moneill@nmsu.edu. Owen Cortner can be reached at ocortner@nmsu.edu.
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