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December 2010

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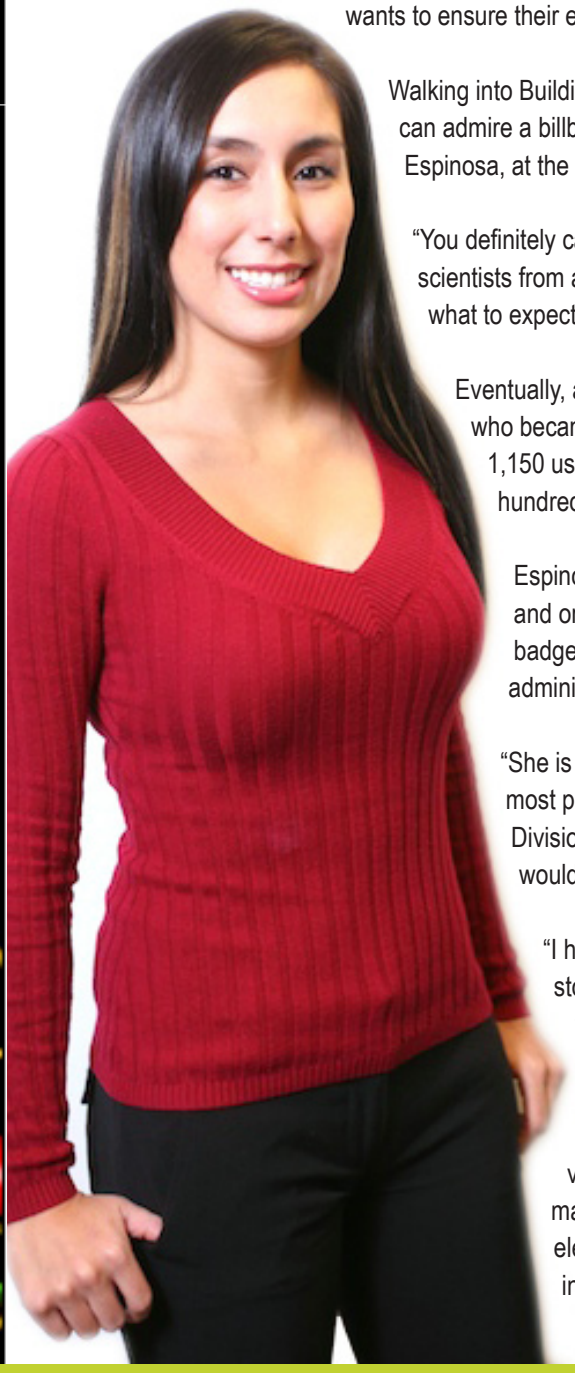
Heads UP!

Aundrea Espinosa

Connecting the LANSCE user community

By Francisco Ojeda
ADEPS Communications



As the first person that users and visitors of the Los Alamos Neutron Science Center (LANSCE) usually see at the national user facility, Aundrea Espinosa wants to ensure their experience is a pleasant one.

Walking into Building 1, the first stop for many LANSCE newcomers, guests can admire a billboard-like display of the user facility. Just to the right is Espinosa, at the reception desk, ready to assist them.

"You definitely can't be grouchy in this job," Espinosa said. "I get to meet scientists from all over the world and I want to set a good example of what to expect at LANSCE."

Eventually, all LANSCE users and visitors interact with Espinosa, who became the user office administrator in April. Yearly, roughly 1,150 users conduct research at the neutron science center and hundreds more visitors tour the facility.

Espinosa is their LANSCE liaison, conducting training and orientation sessions and guiding them through the badge process. She also supports the Division Office with administrative duties.

"She is the face of LANSCE, considering she is the first person most people interact with at the facility," said LANSCE Deputy Division Leader Alex Lacerda. "If she wasn't there, the users would not be able to do their research here."

"I have met a lot of foreign nationals and I get to hear all their stories," said Espinosa, "from where they have been and their experiences at other facilities to the science they have done all over the world."

More than being just a friendly face, Espinosa provides vital support facilitating communication between LANSCE management and users by helping produce a user program electronic publication that is distributed to more than 3,000 individuals around the world.

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From Alex's Desk

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Colleagues,

The 2010 running cycle is ending with a very strong record. Overall all reliability reached the following levels: Isotope Production Facility (89.1%), Ultra Cold Neutron (90.65%), Proton Radiography (92.82%), Lujan Center (84.36%), and WNR (Target-2, 85.91%, Target-4, 86.76%). This takes a tremendous amount of coordination, hard work, and dedication from lots and lots of folks. Good work and congratulations to all involved.

By now you probably seen our own Steven Wender (LANSCE-NS Group Leader) making the front page of LANL's Web page (see http://www.lanl.gov/news/releases/lansce_gets_capacity_boost_nr.html). The Los Alamos National Security (LANS) Board of Governors has approved funding for a new building that enables another flight-path for semiconductor testing. The new flight path will be 30 degrees to the right of the proton beam and will provide the same neutron spectrum as the present ICE House which is located at 30 degrees to the left of the proton beam.

This new endeavor will double the amount of beam time for industry, university, and Laboratory users. This is a good example of LANL's leadership involvement with LANSCE's facilities and confidence in our future as a major player in the field. If you have a chance, stop by and take a look at the progress already made clearing the area for the new building.

UC Berkeley in collaboration with scientists from LANSCE–LC organized a one-day workshop in Berkeley on December 11. The workshop was organized by Professor Rudy Wenk (UC Berkeley, Earth and Planetary Sciences Department), Sven Vogel (LANSCE–LC) and Hongwu Xu (LANSCE and EES–14.

Funded by UC Office of the President, utilizing the STONE (Student Travel for Neutron Experiments), the workshop focused on "Applications of Neutron Scattering to Materials and Earth Sciences." Attendance was impressive (almost 60 students, with the great majority being UC students). I had the great opportunity to attend and give a presentation about LANSCE's sciences program in general and our future plans.

'The Los Alamos National Security Board of Governors has approved funding for a new building that enables another flight-path for semiconductor testing.

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More good news, thanks to your contributions and great dedication from Clay Dillingham and Barbara Maes, we have finished the LANSCE 2007-2009 Activity Report. This particular overall facility report is dedicated to Louis Rosen. The first chapter is dedicated to recounting Louis's tenure at LANL and his approach to creating our state-of-the-art facility. His ingenuity and leadership were paramount to creating an experimental facility with the capabilities and flexibilities that, three decades later, remain powerful and relevant to our international user community and to our national security.

Soon you'll be receiving a copy of the report on a CD. We will also work on having the report available on the Web. We have started the 2010 LANSCE Activity Report almost in parallel; the plan is to have it finished in a couple of months.

As a safety note, regarding cell phone utilization and driving: I know it sounds trivial, but not a good combination, folks. May be it is only because I'm paying more attention, but I still see a lot of people talking on their phones and driving. Please be careful; we are all aware of a fatal accident not too long ago and not too far from our mesa. So, if you must answer your phone, please pull over or just wait when you get to your destination. Your family, your co-workers, and your boss will all understand.

Have a relaxing and safe holiday.

LANSCE Deputy Division Leader Alex Lacerda

Espinosa… "She plays a crucial role in streamlining communication between us and the community, especially the user community," said Lacerda, who described Espinosa as persistent, friendly, and outgoing. And "she enjoys the science, too."

In particular, Espinosa said she is intrigued by the research conducted at the Protein Crystallography Station, the only resource of its kind in the country, used to determine the detailed structures of large biological molecules, essential in the field of bioscience. Espinosa enjoys reading the research proposals and hearing the scientists talk about their research using the instrument.

"I find biology interesting, studying all the different living organisms," said Espinosa, who is studying biology in college.

Espinosa, who has about one year remaining at Northern New Mexico College until she earns her bachelor's degree, said she wants to eventually work in the biological medicine field at the Laboratory, whether at LANSCE or another division.

"I really like it here because there are a lot of good things happening," Espinosa said. "And I am a science geek."

Espinosa began working at the Laboratory in 2004 as an undergraduate student performing data entry in Information Management (HSR-7). She returned in 2008 as an assistant experimental coordinator at the Lujan Neutron Scattering Center, where she helped support the user program through a variety of responsibilities, including managing safety orientation and training and assisting with organizing conferences and creating posters.

"She always goes above and beyond her duties to help the users," said Lujan Center Experimental Coordinator Leilani Conradson, who was Espinosa's supervisor at the time. "She interacts really well with the users who come from all over the world. She is friendly and responsible, and the users appreciate that."

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LANSCE-NS hosts NNSA Academic Alliance Center of Excellence leader

Professor Jolie Cizewski of Rutgers University is on sabbatical as a Visiting Scholar and working with Neutron and Nuclear Science (LANSCE-NS) staff. Cizewski, who was a postdoctoral researcher at Los Alamos from 1978 to1980, is the leader of an NNSA Stewardship Science Academic Alliance Center of Excellence. Cizewski's work focuses on understanding neutron capture reactions and developing alternative experimental and theoretical techniques to determine neutron capture reaction rates where direct measurements are difficult or not possible. Knowing these reaction rates, particularly for small and unstable samples, is important in understanding past nuclear weapons tests as well as understanding the creation of elements in stars. She is leading an experiment at LANSCE using high-resolution gamma-ray detectors to gain insight into spin distributions following neutron capture. These data, compared to data obtained with alternate reactions that probe the same nucleus, will allow evaluation of the accuracy of alternate reaction techniques. Several postdoctoral researchers and students are participating in the experiment in collaboration with Cizewski and LANSCE-NS staff.

Professor Jolie Cizewski (front center) with collaborator Bill Peters and postdoctoral researchers Meredith Howard and Remi Adekola.

Workshop on isotope harvesting at the Facility for Rare Isotope Beams

Los Alamos co-hosted a three-day workshop focused on identifying long-lived radioisotopes that the future Facility for Rare Isotope Beams (FRIB) would produce for numerous applications. The Workshop on Isotope Harvesting at FRIB, co-hosted with Michigan State University, examined collecting isotopes produced from primary experiments for use in secondary applications, such as medical diagnostics and therapy, homeland security, stockpile stewardship, astrophysics, fundamental interactions, nanoprobes for materials science using radioisotopes, and industrial and environmental tracers.

FRIB will be a new national user facility for nuclear science, funded by the DOE and operated by Michigan State University. The facility, which will take about a decade to design and build, will produce intense beams of rare isotopes that will give scientists information about the properties of these isotopes in order to better understand the origin of the elements and the evolution of the cosmos. While the standard mode of FRIB operation will produce a rare isotope beam for a primary user, the fragmentation or fission of the production beam will produce up to 1,000 other isotopes that could be harvested and used for other experiments or applications. In many cases, these isotopes could be collected while a FRIB primary user performs an experiment, with no impact on the primary user. Longer-lived samples of the unused isotopes might be collected and used in an ion source for accelerated beam experiments.

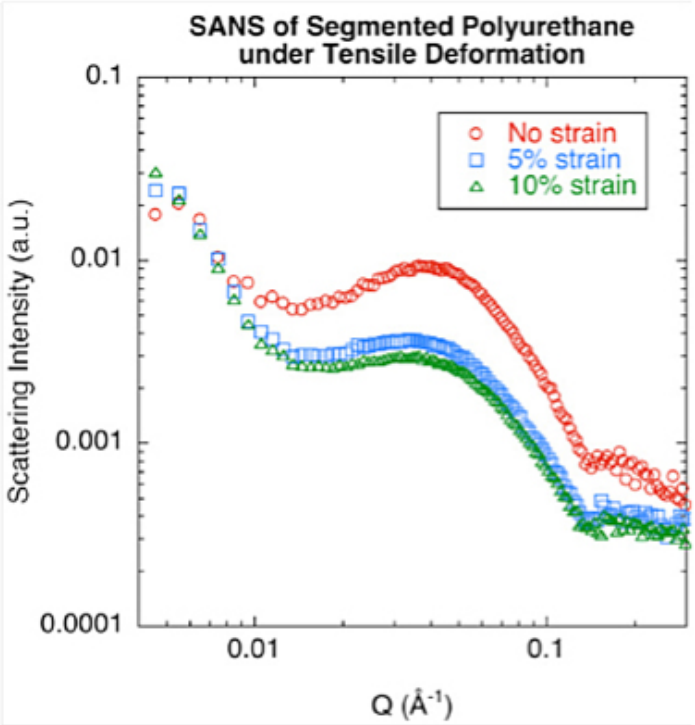
The Santa Fe workshop, which included 34 participants from 11 institutions, also focused on identifying infrastructure requirements for extracting and handling the harvested isotopes to ensure they are considered in the FRIB civil construction. As part of the focus on infrastructure, the workshop toured LANL's hot cells and isotope handling facilities, including the Isotope Production Facility at LANSCE, the CMR (Chemistry and Metallurgy Research) Facility, and the Isotope Production Hot Cells Facility.

Los Alamos organizers included Aaron Couture (LANSCE-NS), Eva Birnbaum, Wayne Taylor, and Mering Nortier (Inorganic Isotope and Actinide Chemistry, C-IIAC); Todd Bredeweg (Nuclear and Radiochemistry, C-NR); and Kevin John (Science Program-Office of Science, SPO-SC). The Laboratory, the DOE Office of Science, and Michigan State University funded the workshop.

Technical contact: Aaron Couture

In situ characterization of multiphase polymeric materials upon deformation

Polymers containing multiple phases are extremely important as lightweight structural materials. Tensile deformation of polymeric materials can cause alignment or orientation of the constituent chains. If the polymeric material has more than one phase, significant changes in the structure may occur upon deformation. The orientation of the polymer chains produces a material that exhibits extremely high mechanical strength in the stretch direction. A commercial application of this technology is the production of high strength fibers, such as Kevlar and Spectra, for bulletproof vests.



Effect of deformation on the neutron scattering of segmented polyurethane.

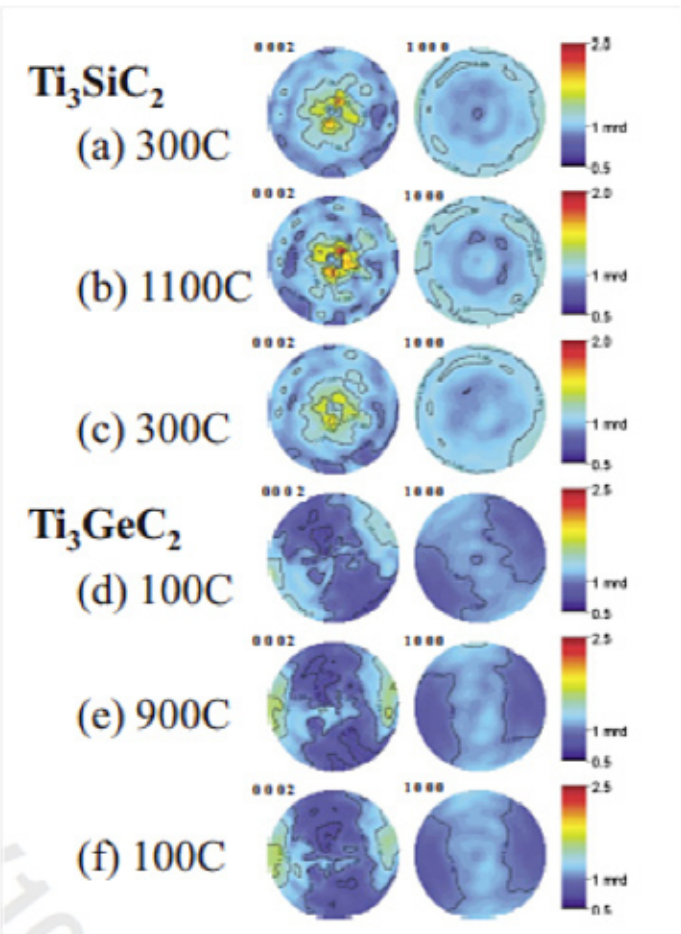
The Laboratory's Institute for Multiscale Materials Studies (a collaborative program with the University of California, Santa Barbara), and the LANSCE-Lujan Center (LANSCE-LC) have developed a capability to monitor in situ the morphological changes upon tensile deformation in polymeric materials. The Polymers and Coatings group (MST-7) used this capability to monitor the influence of deformation on several types of thermoplastic polymers. Small Angle Neutron Scattering (SANS) and isotopic labeling provide a mechanism to isolate the effects of deformation on various portions of the polymer chain. Previous SANS studies on PBX-9501 binder characterized the multiphase structure of a polyurethane elastomer under static conditions. The figure shows the effect of deformation

continued on page 5

Deformation . . . on the neutron scattering of this material. The results will be used to develop a fundamental understanding of the effects that deformation has on the polymer structure and to model the mechanical properties in complex polymeric materials. The team consists of Cindy Welch, Bruce Orler, Debra Wrobleski and David Langlois (MST-7); Arthur Scholz (UCSB); Rex Hjelm and Monika Hartl (LANSCE-LC); Joe Mang (High Explosives Science and Technology, WX-7); Eric Brown (Neutron Science and Technology, P-23); and Dana Dattelbaum (Shock and Detonation Physics, WX-9).

Neutron scattering reveals the atomic motion in a new class of ceramic-metal materials

The so-called MAX phases are a class of materials that are not sure whether they want to be metals or ceramics. While they conduct heat and electricity like metals, they are stiff, strong, brittle, and heat-tolerant like ceramics.



Pole 0002 and 1000 figures recalculated from the orientation distribution of HIPPO data for (a) Ti_3GeC_2 at 300 °C (before heating), (b) 1100 °C, (c) 300 °C (after heating) and, _d_ Ti_3GeC_2 at 100 °C (before heating), (e) 900 °C and, (f) 100 °C (after heating)

There is still a great deal of mystery behind how these materials can withstand such high temperatures while displaying this remarkable combination of properties. Therefore, it is important to determine how the atoms inside the material behave at high temperatures. One useful way of looking at the thermal motion of atoms is by shooting them with a beam of neutron pulses and measuring the way the beam is scattered.

In an experiment by N. J. Lane, M. W. Barsoum (Drexel University) and Sven Vogel (LANSCE-LC) reported in *Physical Review B* (in print), this technique was used to compare the temperature dependencies of the atomic motions in the MAX phases Ti_3GeC_2 and Ti_3GeC_2 as they were heated to 1100° C. It was found that each atomic layer in these structures has a preference to vibrate in a specific direction. For example, the germanium atoms in Ti_3GeC_2 like to vibrate side-to-side while some of the titanium layers vibrate up-and-down. Most intriguingly, it was found that the Ti-Ge bond apparently does not expand with temperature. To explain this unusual response, the authors had to postulate that the atomic motion may be correlated with one another in a hot dance in which they try to avoid each other as much as possible. It was only by making this hypothesis that they could show that the Ti-Ge bond behaves like the Ti-Si bond, in other words "normal."

This work benefited from the use of the Lujan Neutron Scattering Center at LANSCE, which is funded by the U.S. Department of Energy's Office of Basic Energy Sciences.

HeadsUP!

Deduct meals provided on official travel

To remain in compliance with Federal Travel Regulations, LANL employees must deduct any meals provided while on official travel, such as meals included in registration fees or those provided by hotels (continental breakfast supplied by hotels is excluded from the regulation). Provided meals must be deducted even if the employee did not participate in the meal.

Travel processors will return expense reports without meals deducted to employees for correction. For assistance in determining if a meal must be deducted, contact the Travel Office at 667-4314, option 1.

Celebrating service

Congratulations to Alan Shapiro, LANSCE-LC, celebrating his 25-year service anniversary this month.