

Fall 2012

HRC eNews -- Fall 2012

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Repository Citation

Iudice, M. M. (2012). HRC eNews -- Fall 2012.

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Announcements

UNLV Guest Suites

UNLV is now offering on-campus guest suites that are available to students, staff, family members and visiting professionals. They are available on a first-come, first-served basis. More [information and registration](#) is available online.

Join the UNLV Speakers & Experts Directory

Would you like to be featured as an expert or an available speaker in your area of expertise? UNLV now has a new UNLV Speakers & Experts Directory which connects community organizations and journalists to the engaging speakers and subject experts among our faculty and staff. [Join the directory today.](#)

Unmanned Aircraft Systems (UAS)

In conjunction with the Nevada Governor's Office of Economic Development (GOED), UNLV, through the Director of the HRC, Oliver Hemmers, has been named the lead for the Nevada Systems of Higher Education (NSHE) to coordinate the university and college-level research and development efforts relating to the explosively emerging field of Unmanned Aircraft Systems (UAS). In this capacity, the HRC will lead the effort to define experiments to be conducted in Nevada and to establish an academic program for UAS engineering within the Nevada university system. The research effort is already being established through the efforts of **Robert O'Brien** in collaboration with i3 Corporation. A top priority of the Governor, UAS research and development shows great promise to be one of the major new business lines to create jobs and economic opportunity for Nevada.

FAME-Tech Labs

- As of September 2012 the **FAME-Tech Labs** headed by **Kris Lipinska**, are fully operational and open to the public. Visitors can learn about lasers, spectroscopy (Raman, luminescence), processing of materials at extreme temperatures (up to 3100 F) and extreme pressures (up to 1million atmospheres), and see some of the everyday work of materials scientists like fabrication of glasses and ceramics. To enquire about measurement capabilities, interested individuals can contact [Kris Lipinska](#) or stop by the Labs.

-The High-Pressure capabilities of **FAME-Tech Labs** have expanded with the addition of two new high-pressure devices - anvil cells for study of materials under extreme pressures. Another expansion of high-pressure research comes with the addition of a Electric Discharge Machining system with high-magnification microscope unit for drilling, in metals, of circular apertures of the diameter comparable to a human hair, that are not achievable by mechanical drilling means. Other specialized micro-machining operations are possible: machining of slits and apertures to collimate light or x-rays, and cutting small disks or slabs from metal foils, wires, or crystals. This instrument complements high-pressure research equipment.

-In its continuous expansion process the **FAME-Tech**

Submit your news

HRC eNews is an electronic newsletter to keep individuals informed about developments at the Harry Reid Center for Environmental Studies, located on the campus of the University of Nevada, Las Vegas. Quarterly issues of HRC eNews are available online.

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Labs headed by Kris Lipinska added new capabilities in Simultaneous Thermal Analysis, with the installation of a STA 449 F1 Jupiter, NETZSCH-Gerätebau GmbH. Measurement capabilities include differential scanning calorimetry (DSC) and thermo-gravimetry currently working up to 1550 degrees C (2,800 F). The possibilities of analysis include specific heat (Cp), thermo kinetics, oxidative stability, material purity determination, melting/crystallization behavior, solid-solid phase transitions, polymorphism, degree of crystallinity, glass transitions, purity, thermo kinetics, mass changes, decomposition, corrosion etc.

Esteemed colleague and distinguished fellow, **Dr. Jim Laidler**, recently announced his retirement from Argonne National Laboratory. Winner of numerous Argonne Chemical and Sciences Awards including the Distinguished Performance Award, Outstanding Achievement Award and two time winner of the Mishma Award, Dr. Laidler kindly served as guest lecturer at the Radiochemistry Fuel Cycle Summer School in 2011 and 2012.

Accomplishments

John Despotopulos, a UNLV radiochemistry student, was awarded the prestigious Lawrence Scholar Award which is a 4 year paid fellowship at Lawrence Livermore National Lab. **Ralf Sudowe** is his advisor. This award is extremely difficult to get and is a terrific accomplishment for John and the radiochemistry program.

Ken Czerwinski was recently elected to the American Association for the Advancement of Sciences as a Fellow. He is being honored for distinguished contributions to actinide and fission product chemistry and in recognition of the world-class radiochemistry program at UNLV.

Robert O'Brien was recently awarded \$200,000 from NSTec for Nuclear Forensics Support for DPF Experiments - Task 46.

Denis Beller was recently awarded \$185,219 from NSTec for Support to NSTec for the Nuclear Criticality Safety Program.

Oliver Hemmers & Steve Curtis were recently awarded \$100,000 from Oak Ridge National Laboratory (ORNL) for Global Security Directorate Initiatives.

Ken Czerwinski was recently awarded \$75,000 from CUNY-Hunter College for SISGR-Fundamental Chemistry of Technitium-99 research.

Kathy Lauckner is an invited speaker at the Lead and Healthy Housing Conference to be held January 31 - February 1, 2013 at the Marina Del Ray in Los Angeles. Kathy will moderate a workshop based on her dissertation work for the *critical factors* necessary to develop a successful lead poisoning prevention program. The conference will bring together professionals from health, housing, community development, community groups, advocacy organizations, the lead industry, real estate firms, and residential and commercial facilities to explore ways to undertake programs and projects designed to prevent incidents of lead poisoning, eliminate indoor environmental hazards, and create healthy living and working environments.

Paula Garrett and **Gretchen Andrew** from the HRC

presented with Dr. Daniel Thompson of Life Science at the UNLV Geovisualization Facility at GIS and Remote Sensing Core Lab open house. They presented on Spatial Visualization of Habitat and Possible Dispersal Corridors of Rare, Endemic Butterflies. The research group has just completed a 3 year study of rare butterflies on the Spring Mountains and is currently preparing their final reports to the U.S. Forest Service and U.S. Fish and Wildlife Service.

Ken Czerwinski visited the School of Energy Research at Xiamen University, China where attend the International Symposium on Nuclear Energy and Fuel Cycle as a guest speaker. While in China, he discussed potential collaborative work with both Tsinghua University and Shanghai Jiao Tong University.

Edward Mausolf, Radiochemistry PhD student, defended his dissertation on Friday, November 30, 2012 in the Marjorie Barrick Museum Auditorium and accepted a post-doctoral position at Pacific Northwest National Laboratory. Dr. Mausolf will attend UNLV's graduation ceremonies this spring where he will be recognized as UNLV's Outstanding Graduate for his research contributions.

The Radiochemistry Program continues to grow with the addition of two new Doctors of Philosophy to the program. **Dallas Reilly** successfully defended his dissertation, "Molecular Forensic Science Analysis of Nuclear Materials" and **Thomas O'Dou** defended his dissertation titled "Recycling and Reuse of Radioactive Materials." Dr. Reilly will be joining the team at Pacific Northwest National Laboratory and Dr. O'Dou remains on staff with Dade Moeller, an occupational safety consulting firm.

The American Nuclear Society winter meeting held this year in San Diego was well attended by members of the Radiochemistry Program. **Edward Mausolf, Janelle Droessler, Balazs Bene** and **Audrey Roman** presented posters outlining their research at the meeting held November 11-15, 2012.

Kathy Lauckner was an invited speaker at the 14th annual Tri-Regional Lead Program Conference sponsored by the U.S. Environmental Protection Agency (EPA), Region 10, in Portland, Ore., in September. She has been involved in the actions to [prevent lead poisoning](#) since 1992. She now is promoting a cooperative blending of EPA, U.S. Housing and Urban Development, and Occupational Safety and Health Administration regulations to eliminate the redundancy in worker safety curriculum.

FAME-Tech Labs

-Graduate student **Pat Kalita** (UNLV, Physics) discovered a new pressure-induced phase transition in a heavy-metal doped mullite-type ceramic subjected to pressures of 900,000atm. while doing laser spectroscopy experiments in HRC's **FAME-Tech Labs**. This work is a collaboration between the HRC's **FAME-Tech Labs (Kris Lipinska and Oliver Hemmers)**, UNLV's Dept. of Physics and Astronomy (Andrew Cornelius and Pat Kalita), the University of Koeln and the University of Bremen. The laser spectroscopy set-up at **FAME-Tech Labs** Laser is equipped with a Horiba Jobin-Yvon T64000 triple-grating spectrometer, an Olympus BX-41 confocal Raman microscope and an Argon/Krypton 2 W multi-wavelength laser. This set-up allows to measure ambient and elevated pressure

Raman spectroscopy and luminescence spectroscopy on solid, gaseous and liquid samples. The possibilities of analysis include: chemical composition of material, its microstructural changes, stress/strain state analysis, determination of crystal symmetry and orientation, fundamental analysis of vibrational modes and more

-**Kris Lipinska** and **FAME-Tech Labs** started a collaboration with Purdue University, School of Aeronautical & Astronautical Engineering on the study of hydrogen absorption in glass-ceramic materials.

-**FAME-Tech Labs**, in partnership with the UNLV's Dept. of Physics, begun a collaboration with researchers from the University of Bremen, Germany on non-linear Optical and advanced ceramic materials for extreme environment applications. The collaboration involves materials synthesis (single crystals and powders), laser spectroscopy at high-pressure and synchrotron x-ray diffraction.

Nuclear Safety Engineering Program

Denis Beller, Director of the Nuclear Safety Engineering Program, has been appointed to the Facility Subcommittee of the Nuclear Energy Advisory Committee (NEAC) of the US Department of Energy (DOE). The NEAC advises the Secretary of Energy, the Assistant Secretary for Nuclear Energy, and the Office of Nuclear Energy (DOE/NE). Co-chairs of the NEAC are Richard Meserve (President of the Carnegie Institution for Science and former Chairman of the US Nuclear Regulatory Commission) and Susan Eisenhower (Chairman of Leadership and Public Policy Programs & Chairman Emeritus of the Eisenhower Institute and Pres. of the Eisenhower Group, Inc.), and its small membership includes NSTec, LLC President Raymond Juzaitis and HRC Radiochemistry collaborator **Al Sattelberger** (Associate Director of Argonne National Laboratory). The Facility Subcommittee, which is chaired by John Sackett (former Director of Argonne National Laboratory West), analyzes capabilities of facilities that support the research missions of DOE/NE, including U.S. universities and national laboratories, and produces reports for DOE/NE regarding facility-related research strengths and deficiencies.

The Nuclear Safety Engineering Program (Director **Denis Beller** and Technical Director **Charlotta Sanders**) submitted to the College of Engineering Curriculum Committee proposals for 3 new graduate, distance-education Nuclear Engineering courses and a distance-education program for a Graduate Certificate in Nuclear Criticality Safety Engineering. The Department reviewed the proposals, recommended changes, and forwarded the modified proposals to the UNLV Curriculum Committee. The proposed courses are:

- ME 754 Introduction to Nuclear Criticality Safety
- ME 755 Nuclear Criticality Safety Engineering
- ME 756 Monte Carlo Methods in Nuclear Engineering

Denis Beller gave a graduate nuclear engineering seminar on October 22, 2012 at Idaho State University entitled, "Public Education Is Not the Answer to Nuclear Acceptance--Then What Is?"

Denis Beller gave an oral presentation: "Nuclear Engineering for GREATS," at the GREATS (Gravity and Radiation Environment Aerial Trans-Small Satellite Surveyors) Workshop, University of Nevada, Las Vegas, September 24, 2012.

Denis Beller gave two oral presentations on cybersecurity for nuclear safety systems such as fire alarm, emergency shutoff, and nuclear criticality alarm systems:

-"Cybersecurity in the Nuclear Safety Engineering Program," **Denis Beller**, presented at the Cybersecurity Collaborations Symposium (with ORNL, NSTec, and Mississippi State University), University of Nevada, Las Vegas, Sep. 11, 2012.

-"Educating the Cybersecurity Nuclear Engineering Workforce," **Charlotta Sanders** and **Denis Beller**, presented at the Cybersecurity Collaborations Symposium (with ORNL, NSTec, and Mississippi State University), University of Nevada, Las Vegas, Sep. 11, 2012.

Charlotta Sanders, Technical Director of the Nuclear Safety Engineering Program, organized a MCNP Criticality Workshop for UNLV students who are taking her graduate nuclear engineering courses as part of the proposed Graduate Certificate in Nuclear Criticality Safety Engineering (NCSE) program. The MCNP Workshop, which was presented in Eunice, NM by Dr. John Hendricks of LANL/TechSource, was sponsored by URENCO USA (owner/operator of the National Enrichment Facility in Eunice). URENCO is supporting and participating in the proposed NCSE Certificate program by supporting the enrollment of URENCO employees in the UNLV NCS courses (staff include NCS and licensing engineers and enrichment plant operators).

Ken Czerwinski and participants in the Radiochemistry program attended the 2012 Atalante Conference on Nuclear Chemistry for Sustainable Fuel Cycles in Montpellier, France September 3-7. **Thomas Hartmann**, **Frederic Poineau**, **Maryline Ferrier**, **Edward Mausolf** and **Ariana Alaniz** gave presentations on their work at UNLV during the scientific program. UNLV was also well represented during the poster session with posters submitted by **Bill Kerlin**, **Maryline Ferrier** and **Edward Mausolf**.

Frederic Poineau, **Ken Czerwinski** and **Al Sattelberger** attended the 40th Annual International Conference on Coordination Chemistry (ICCC40) in Valencia, Spain. In addition to work on furthering international collaborations, they presented research on the *Utilization of Radioelement Compound Synthesis and Coordination Chemistry for the Nuclear Fuel Cycle* and the *Study of the Octahaloditechnetate $Tc_2X_8^{n-}$ ($X = Cl, Br$; $n = 2, 3$) Anions and Their Phosphines Derivatives* at the conference.

Ken Czerwinski was invited to attend the DOE Nuclear Separations Workshop in Washington, D.C. The mission of the workshop was to define and describe work in nuclear separations that will be needed to advance DOE's mission and identify the resources that will be needed to carry develop and demonstrate these technologies.

Homeland Security Initiatives

In May 2011 the national media reported that a French diplomat had been arrested for sexually assaulting a New York hotel guest room attendant. This incident and others reported over the years highlighted the many safety concerns for all hotel employees. These incidents also motivated the Las Vegas hotel and resort community, led by initiatives from MGM Resorts International and Boyd

Gaming, to work together on a Guest Room Attendant Safety and Security DVD training project. This DVD project, sponsored by the Las Vegas Convention and Visitors Authority (LVCVA), would use the Emmy-nominated DVD training production team led by **Ross Bryant** Program Manager from the University of Nevada Las Vegas Harry Reid Center and would be a collaborative effort by LVCVA, UNLV, Nevada Hotel & Lodging Association, MGM Resorts International, Boyd Gaming, Caesar's Entertainment, and Station Casinos. The 5- to 6-minute DVD produced in both English and Spanish would demonstrate best practices and procedures to enhance the safety and security of more than 25,000 employees and be available to all hotels and resorts throughout Nevada.

The Louisiana State University (LSU) National Center for Biological Research and Training (NCBRT) has renewed their partnership with the UNLV HRC to continue the NCBRT training equipment distribution center at UNLV. The LSU NCBRT currently ships over 5,000 packages annually. The renewed contract with the HRC is to store training equipment and ship from UNLV to cut down on the shipping distances. The HRC will ship over 10,000 pounds of training equipment in the first year. The establishment of the LSU-UNLV distribution center is a strong step in developing additional work from other National Consortium Members.

Events

Nuclear Forensics Undergraduate Summer School

The Radiochemistry Program at UNLV has been awarded the Nuclear forensics Undergraduate Summer school for the second time since the program's inception three years ago. The program, which is a collaboration with Los Alamos National Laboratory, University of Missouri, Washington State University, Lawrence Livermore National Laboratory and the Domestic Nuclear Detection Office, will be held at UNLV's campus in the summer of 2013 and will give talented undergraduates an opportunity to learn about radiochemistry and nuclear forensics by doing hands-on experiments and in-depth study of the chart of the nuclides.

Radiochemistry Fuel Cycle Summer School

UNLV will be hosting the Radiochemistry Fuel Cycle Summer School for the fourth consecutive year from June 10 – July 19, 2013. Funded by the Department of Energy, Nuclear Energy and organized by the Radiochemistry Program at UNLV, this program offers undergraduate students in chemistry, physics, health physics and nuclear engineering the opportunity to learn the fundamentals of radiochemistry with emphasis on the nuclear fuel cycle. Radiochemistry professors **Ken Czerwinski** and **Ralf Sudowe** will be instructing the course in addition to guest speakers from various national laboratories.

Emerging Technology for Industrial Accelerator Symposium

Planning is underway for the first annual Accelerator Symposium to be held at UNLV October 9 -10, 2013. The symposium is part of a partnership with Varian Medical Systems to raise awareness and interest in the various applications of accelerators to solve real-world problems. The event will highlight the opening of UNLV's dedicated Accelerator Facility and include an opportunity to tour Varian's industrial accelerator manufacturing headquarters. Sign up to receive mailing list updates and/or register to attend the event on the symposium website at hrc.unlv.edu/nvtech101/.

Oliver Hemmers and **Kris Lipinska** held the Kick-Off meeting of the Phase-3 of their DOE-funded multi-year, multi-million dollar project on the development of BioFuels. The meeting, held on September 7, 2012 was attended by representatives from Ceramatec Inc. and from Rensselaer Polytechnic Institute.

Cybersecurity Collaborations Symposium

UNLV has developed collaborations with Oak Ridge National Laboratory, the University of Tennessee, and Mississippi State University to pursue research opportunities in cyber security as it relates to National Security Requirements. The Harry Reid Center hosted the first annual Cybersecurity Collaborations Symposium on September 11, 2012 to present the technologies required and to discuss the implications of those requirements. Speakers in attendance included representatives from Oak Ridge National Laboratory, Mississippi State University, UNLV, and the Nevada National Security Site. Presentations can be viewed on the [symposium website](#).

Planning the Urban Forest Workshop

On September 20, 2012 the HRC co-hosted the Planning the Urban Forest Workshop along with the Southern Nevada Regional Planning Coalition and the Nevada Chapter of the American Planning Association. This workshop addressed the social, environmental and economic benefits of urban forests in Southern Nevada. A tour was provided to workshop participants of the Donald Baepler Xeric Garden as well as turf removal processes at UNLV that save trees.

Steve Curtis and **Craig Palmer** attended a federal proposal writing workshop for NSF and NIH grants held at the Lied Library on October 17, 2012, entitled "How to Find and Win Government Grants." The free workshop was funded by Nevada INBRE (IDeA Network of Biomedical Research Excellence).

Oliver Hemmers was invited by the Nevada Institute for Renewable Energy Commercialization (NIREC) to attend the SciTech Hookup event, held at the World Market Center on October 25, 2012.

Nuclear Science Merit Badge Workshop for Boy Scouts

The 11th Nuclear Science Merit Badge workshop was held on November 17th, 2012 at UNLV's College of Engineering and the National Atomic Testing Museum (NATM). One of the main objectives of the workshop is to increase knowledge of "things nuclear" within the Las Vegas community. The workshop consists of three interactive class room activities including lectures, a tour of the radiochemistry laboratories, a tour of the National Atomic Testing Museum, and two practical exercises at the museum. 34 Boy Scouts attended this year's workshop (4 from California). Seven members of the UNLV American Nuclear Society Student Chapter (**Audrey Roman, Balazs Bene, Janelle Droessler, Dan Lowe, Rebecca Springs, Aldo Chavira, John Despotopoulos**) and one member of the ANS Nevada Section (**Steven Curtis**) participated in planning and instructing during the event. **Audrey Roman** assembled the classes and organized the presentations. This was the 11th time the ANS and the HRC have teamed up to present the workshop for Boy Scouts. The workshop is open to all Boy Scouts and Girl Scouts, but is oriented to allow Boy Scouts to earn the Nuclear Science Merit Badge. Classes were presented in the College of

Engineering building and the scouts were shown radiation laboratories and treated to a tour of the NATM. The workshop is offered twice a year in May & November and can accept up to 40 Boy Scouts per session. Over the last 5 and a half years, about 400 Scouts have earned the Nuclear Science Merit Badge. The workshop is open to the public and there is no limit to how many observers can participate. The spring 2013 session is scheduled for Saturday, May 4, 2013.

Oliver Hemmers & Steve Curtis, along with UNLV's Vice President for Research, Thomas Piechota, visited Mississippi State University on November 26th - 28th, to further discuss the collaboration with Oak Ridge National Laboratory (ORNL) and the Nevada National Security Site (NNSS). The visit also included a tour of the MSU facilities and labs.

Publications

A collaboration of **FAME-Tech Labs** of HRC with UNLV's Department of Physics, the University of Koeln, Germany and the Carnegie Institution of Washington has come to fruition in the form of a full length paper submitted to the reputed *Journal of the American Ceramic Society*, "High Pressure Behavior of Mullite: An X-Ray Diffraction Investigation" by **Patricia Kalita**, Hartmut Schneider, **Kristina Lipinska**, Stanislav Sinogeikin, **Oliver Hemmers** and Andrew Cornelius.

Manuscript Technetium Chemistry in the Fuel Cycle: Combining Basic and Applied Studies, **Frederic Poineau, Edward Mausolf, Gordon Jarvinen, Al Sattelberger and Ken Czerwinski** has been accepted into the journal, *Inorganic Chemistry*.

William (Bill) Smith Jr. had his article "Climatic change and desert vegetation distribution: Assessing 30 years of change in southern Nevada's Mojave Desert" accepted for publication to the journal *The Professional Geographer*. Other authors include **Haroon Stephen**, Scott Abella, C Roberts and Ross Guida.

Recent publications by Wayne Stolte and the x-ray atomic molecular spectroscopy group in Berkeley, CA include:

· K.P. Bowen, **W.C. Stolte**, A.F. Lago, J.Z. Dávalos, M.N. Piancastelli, and D.W. Lindle, "*Partial-ion-yield studies of SOCl₂ following x-ray absorption around the S and Cl K edges*", resubmitted to *J. Chem. Phys.* **137**, 204313 (2012).

· X. He, I.N. Demchenko, **W.C. Stolte**, A. van Buuren, and H. Liang, "*Synthesis and transformation of Zn-doped PbS quantum dots*", *J. Phys. Chem. C* **116** (2012).

· S. Carniato, L. Journal, R. Guillemin, M.N. Piancastelli, **W.C. Stolte**, D.W. Lindle, and M. Simon, "*A new method to derive electronegativity from resonant inelastic x-ray scattering*", *J. Chem. Phys.* **137** (2012) 144303.

· S. Carniato, P. Selles, L. Journal, R. Guillemin, **W.C. Stolte**, L. El Khoury, T. Marin, F. Gel'mukhanov, D.W. Lindle, and M. Simon, "*Thomson-resonant interference effects in elastic x-ray scattering near the Cl K edge of HCl*", *J. Chem. Phys.* **137** (2012) 094311.

New Faces

New students recently welcomed to the Radiochemistry

PhD Program include:

AJ Swift received his bachelor of science degree in chemistry from Huntingdon College in Montgomery, Alabama with a minor in mathematics. Originally from Cocoa, Florida, AJ participated in the Nuclear Chemistry Summer School at Brookhaven National Lab and has developed an interest in pursuing research in the lanthanides, actinides and the nuclear fuel cycle while studying at UNLV.

Nick Wozniak joins us from Hope College in Michigan where he received a double bachelor of science degree in both chemistry and physics. A member of the Hope College Nuclear Group, his research interests center around the field of nuclear forensics where he has spent much time working on a project which aims to quantify and characterize the production and extraction yields of six long-lived isotopes.

Lucas Boron-Brenner comes to UNLV from the University of Maryland at College Park where he received his undergraduate degree in chemistry. During his undergraduate career, he worked as a research assistant where he prepared samples and used ICP-MS for laser ablation. While at UNLV, Lucas hopes to work with advanced radioanalytical and radiochemical separation techniques and nuclear forensics research.

Romina Farmand received a bachelor of science in Chemistry and a bachelor of arts in Biochemistry from the University of Washington where she was on the Dean's list. Romina's current interests include working with technetium.

Kyle Childs received his undergraduate degree in Chemistry/Radiochemistry from South Carolina State University. Originally from Knoxville, Tennessee, Kyle first joined the radiochemistry group in 2011 when he participated in the Fuel Cycle Summer School hosted by UNLV. He has worked as an intern at the University of Tennessee in the field of nuclear forensics in addition to serving as a research assistant in the rad labs at South Carolina State.

Jackie Dorhout earned her undergraduate degree in chemistry from the University of Massachusetts Amherst. She came to Las Vegas in 2010 where she participated in the UNLV Radiochemistry Fuel Cycle Summer School. In 2011, she was accepted at the Brookhaven National Lab Nuclear Chemistry Summer School. Her research interests include the synthesis and characterization of actinide and lanthanide compounds and nuclear fuel research.



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