Division of Nuclear Chemistry and Technology
American Chemical Society

NUCL Webpage – http://www.nucl-acs.org

NEWSLETTER
April 2021

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FROM THE CHAIR

Thomas Albrecht-Schönzart

Dear Colleagues,

I hope this newsletter finds you healthy, productive, and in good spirits. The COVID-19 pandemic is finally being mitigated, and my hope for all of you is that life returns to a new normal. The NUCL division continues to function well within the current constraints, and I think the Spring ACS meeting went well, and we had many cutting-edge symposia sponsored or co-sponsored by the division. The Fall meeting in Atlanta will be a hybrid meeting and is bound to be a great venue for reporting all of our new science. Leadership of the NUCL division will be creating a new strategic plan in April that will help guide the division for the next five years. We look forward to continued growth of our division.

Members of the Executive Committee worked with ACS facilitators in April to create a new Strategic Plan for the NUCL division that covers the next five years. We are opening up the plan, provided at the end of the newsletter, for comments from the division as a whole. Please send comments to talbrechtschoenzart@gmail.com by May 31, 2021 so that we can consider your additions and revisions before we vote to adopt the strategic plan.

NATIONAL MEETING PROGRAMMING

FALL 2021 – Atlanta, GA / Hybrid
AUGUST 22 – 26
Theme: Resilience of Chemistry

The 262nd ACS National Meeting & Exposition will be held August 22-26 in Atlanta, GA. The Format is hybrid, having both in-person and virtual components. Please contact Gian Surbella (robert.surbella@pnnl.gov). Oral Sessions are listed below; the abstract deadline has passed.

- **Seaborg Award Symposium in Honor of Sherry Yennello**

Understanding nuclear reactions is important for discovery science, delivering for society and developing future workforce. This symposium will celebrate the achievements of Sherry Yennello that span all three of these dimensions of nuclear reactions research. The presentations will demonstrate the importance of inclusive excellence in pursuit of fundamental and applied studies.
Organizers:
Lauren McIntosh
lheilborn@tamu.edu and
Joe Natowitz
natowitz@comp.tamu.edu

- **Nuclear Forensics**

This session will focus on nuclear and radiochemistry as they pertain to nuclear forensics science. Suggested Topics include: Case Studies or Evaluations of Samples of Opportunities, Analytical Methods for the Analysis of Special Nuclear Materials and Radioactive Materials, Morphological and Microstructural Features for Group Inclusion/Exclusion, Novel Evaluation Techniques, and Radiochronometry.
Organizers:
Jon Schwantes
Jon.Schwantes@pnnl.gov and
Brittany Robertson
brittany.robertson@pnnl.gov

- **Young Investigators in Nuclear & Radiochemistry**

This symposium is a platform for young investigators, spanning undergraduate through 5 years after receiving their Ph.D., to present their research. Topic areas include nuclear and radiochemistry, with a focus on: Medical and standard isotopes production, Actinides and fission products chemistry, Actinides materials and nuclear waste forms, Actinides and fission products spectroscopies, Geological/environmental actinide chemistry, and Synthetic Actinide Chemistry.
Organizers:
Gabe Hall
gabriel.hall@pnnl.gov and
Thibaut Lécrivain
Thibaut.Lecrivain@inl.gov

- **General Topics in Nuclear Chemistry and Technology**

This symposium will focus on topics of interest in nuclear and radiochemistry that range from fundamental exploratory science to applied nuclear science and emerging technologies.
Organizers:
John Auxier
jdauxier@lanl.gov and
Rebecca Mueller
Rebecca.Mueller@colostate.edu

- **Computational Science for Lanthanides and Actinides**

This session focuses on applications of computational science to lanthanides and actinides to advance solutions in nuclear and radiochemistry needs. Topics include integrated experimental and theoretical research, computational chemistry modeling, software development, high performance computing (HPC) advances, and theoretical chemistry and physics. The multidisciplinary nature of this session contributes to strengthening resilience in chemistry. It creates collaborations and fosters a collegial environment to support

ACS members at all career levels.
Organizers: Deborah Penchoff
dpenchof@utk.edu
Theresa Windus
twindus@iastate.edu and
Charles Peterson
charles.c.peterson3@gmail.com

- **Data Science and Artificial Intelligence Applications in Nuclear and Radiochemistry**

This session focuses on applications of artificial intelligence (AI) to nuclear and radiochemistry needs. It highlights advances in current data science techniques and trends in model predictions. Topics include broad AI interests including machine learning, neural networks, algorithm design, and data science and analytics to evaluate properties of interest including material design, morphology analysis, molecular systems, detection and spectroscopy, and new accuracy standards determination. As growth in high performance computing capabilities continues to increase, AI applications enable a new level of insight which contributes to chemistry's resilience in providing solutions for national and global interests.
Organizers:
Deborah Penchoff
dpenchof@utk.edu
Theresa Windus
twindus@iastate.edu and
Charles Peterson
charles.c.peterson3@gmail.com

SPRING 2022 – San Diego, CA
March 20 - 24
Theme: Bonding Through Chemistry

The 263rd ACS National Meeting & Exposition will be held March 20-24, 2022 in San Diego, CA. We are looking for volunteers to organize symposia for this meeting. Please contact Tara Mastren (Tara.Mastren@utah.edu) with potential symposia topics or for more information.

- **Young Investigators in Nuclear and Radiochemistry**
Organizers: TBD

- **General Topics in Nuclear Chemistry and Technology**
Organizers: TBD

COUNCILOR'S REPORT
Silvia Jurisson and Graham Peaslee

The ACS is governance structure is largely comprised of elected councilors that represent either Technical Divisions (20%) or Local Sections (80%). The Nuclear Division remains large enough to have two ACS councilors who represent our interests at the Council Meeting held at every national meeting as well as on several sub-committees that discuss matters that impact the Division. Together with Nuclear Division members that represent local sections the Councilors funnel information from the ACS governance to the Nuclear Division members and they also can convey concerns from the membership to the ACS leadership.

The Spring ACS meeting scheduled for San Antonio was again virtual and the Fall 2021 meeting scheduled for Atlanta is currently scheduled as hybrid. Both of us attended the virtual Spring meeting, For those of you who attended the Spring 2021 virtual ACS meeting, we would like to hear any comments and suggestions you have. This virtual meeting was improved over the Fall virtual meeting, with talks being live and with the Q&A sessions following each live talk rather than at the end of the session.

The ACS Council meeting was held virtually ahead of the ACS meeting, on 24 March 2021. We learned that there were 6,477 registered attendees, which included 1,638 students. There were 4,067 presentation uploads, including the pre-recorded oral and poster

presentations. Some of the pre-recorded oral presentations were on-demand only and some were held during pre-set sessions with live Q&A sessions at the end handled by a moderator and the speakers live. This was definitely a much better experience, but if you have more suggestions for how to improve the experience for members, please reach out to your councilors and we'll be happy to pass them along.

Silvia Jurisson became an Associate Member of the Committee on Economic and Professional Affairs (CEPA; she completed her 2 terms on the Meetings & Expositions (M&E) committee) and attended her first virtual meeting on 6 March 2021. There was discussion on the upcoming Career Development classes (open to all ACS members but must register) and about Career Consultant initiatives (350+ virtual consultations began in April 2020 and weekly zoom virtual office hours with Career Consultants have occurred since April 2020. There was an update on the Employment Survey and a list of upcoming career development courses (listed on the ACS website). Additionally, Silvia Jurisson serves on the ACS Future Meetings Taskforce, which has been meeting virtually about every 2 weeks. We sent the first draft of our report to various ACS committees for comment before we submit the final version to the ACS Board of Directors in June.

From the Divisional Activities Committee (DAC) meeting (Graham Peaslee is a returning member of this committee) a resolution was brought before council to amend the way dues are re-distributed among Divisions, since part of the prior formula was based on member attendance at national meetings. With virtual meetings, this was difficult to continue, so a simplification of the dues distribution formula was proposed. The distribution formula for Divisional Allocations has 9% of the ACS Member Dues Pool allocated to the technical divisions. The proposed new allocation formula reduces the year-to-year variation in the distribution amount, increases the base allotment and the per division member allotment portion of the pool, increases the amount devoted to Innovative Project and Strategic Planning Grants (from 10% to 15%), and caps the year to year distribution gain/loss to 7.5%; this formula will be reviewed annually by the Committee on Divisional Activities. This proposal was passed by Council. In addition, the ACS has temporarily doubled the budget this year for Innovative Project Grants – which are available for divisions to request funding to try new initiatives to strengthen divisional programming and membership connections. If you have suggestions for ways in which the Nuclear Division might respond to the changes wrought by the pandemic, or could increase its connections with other Divisions of the ACS, please let us know and we will support proposals to try new Divisional activities that would benefit members.

At the main Council meeting, electronic balloting for candidates for President-Elect 2022 nominated Judith C. Giordan and John C. Warner. Candidates selected by internet ballot for District I were D. Richard Cobb and Katherine L. Lee and for District V were Lisa Balbes and Joseph A. Heppert. The candidates for Directors-at Large announce by the Committee on Nominations and Elections for 2022-2024 terms were Rodney M. Bennett, Arlene Garrison, Natalie A. LaFranzo and Lee H. Latimer; ballots will be distributed in the fall to fill these positions.

Council approved the Petition to Harmonize Committee Structures, Processes and Terms so that there is consistency across committee terms and number of terms, and will become effective on approval by the Board of Directors.

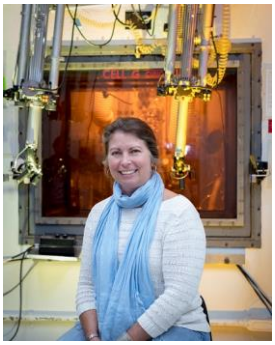
Council approved the 2022 Schedule of Membership, which reduces the base dues

rate to $160 per year. It also established various dues categories and benefits packages based on career stages, role in the chemical enterprise, and desired level of interaction by the Member with the Society.

If you have any additional suggestions for the ACS, or concerns about anything ACS-related, please don't hesitate to contact your councilors who will do their best to let your voice be heard.

NUCL DIVISION MEMBER HIGHLIGHT

Alison Tamasi, Editor



Julie Ezold
Section Head – Radioisotope Production and Operations
Oak Ridge National Laboratory

Julie Ezold is a legend in the field of radiochemistry, having been part of the team that discovered, confirmed, and named a new element: Element 117, Tennessine. Her exceptional skill and determination have won over colleagues and mentors throughout her career, and now as she heads up radioisotope production and operations at ORNL she is continuing that by lending her dedication to the many scientists and programs that she has guided and shaped. In high school Julie had already gotten a small taste of studying nuclear chemistry and knew that she wanted to be a nuclear engineer; but as she was pursuing her engineering degree at Rensselaer Polytechnic Institute, she found herself being drawn to the chemistry aspects of nuclear power and leaned-in to that interest with her studies. While completing her master's degree with a DOE fellowship at NC State University, Julie took part in a practicum at ORNL. She worked under Dr. Frank Dyer studying I-129 samples, and was so impressive that in just 12 weeks she had a first-author paper and the promise of post-graduation job offers. Since then, she has spent her eminent career working at ORNL, having leant her expertise to numerous aspects of the lab's mission before returning full-circle to working in isotope production. When she isn't busy doing the kind of groundbreaking radiochemistry that has garnered her numerous awards and a Wikipedia page, Julie spends time playing the piano and enjoying the company of her delightful 12-year-old daughter.

NUCLEAR CHEMISTRY SUMMER SCHOOL

Lynn Francesconi

The Nuclear Chemistry Summer School (NCSS) will be totally virtual this year (June 14, 2021 – July 23, 2021) due to COVID-19. As we did last year, the 12 students slated for the Brookhaven site and the 12 students slated for the San Jose State University site will be together in the online course.

The curriculum committee, consisting of radiochemists and pedagogical experts, are organizing the lectures, laboratories, guest lectures and virtual tours. This committee includes Jeff Bryan, Melissa Deri, Vanessa Sanders, Trish Baisden and Hank Bechtel. We will have four TAs who are NCSS 2020 alumni to help with grading, office hours, and happy hours. Annalise Van Wyngarden and Melody Esfandiari, of SJSU, are arranging many details of the online summer school including organizing the online platform and arranging for books and materials to be sent to the students.

We had about 150 complete applications this year and I would like to thank the selection

committee for reading and evaluating the applications. This was a big job. This year's selection committee is comprised of Leah Arrigo, Eszter Boros, Mark Jensen, Gregory Severin, and Alison Tamasi. I also thank Mr. Lamount Evanson and Ms. Shontel Houston of CUNY for helping to organize the applications for the selection committee review. We are extremely grateful to the Department of Energy, Office of Science, Heavy Element Chemistry and the Isotope Program for funding and for their unwavering support of the NCSS.

AWARDS NOMINATIONS COMMITTEE OF NUCL
Thomas Albrecht-Schönzart

The Awards Nominations Committee of the Division was formed to encourage and facilitate nominations for national ACS awards. Please nominate a colleague for one of the awards given below or another ACS award (https://www.acs.org/content/acs/en/funding-and-awards/awards/national.html).

The Awards Nominations Committee is seeking nominations for the Frank Kinard Distinguished Service Award in Nuclear Chemistry. This award seeks to recognize individuals that have provided significant and sustained service to the NUCL division and nuclear sciences in the broadest sense. Please send nominations to the chair of the Awards Nominations Committee, Thomas Albrecht-Schönzart (talbrechtschnoezart@gmail.com).

GEORGE WASHINGTON UNIVERSITY NUCLEAR SECURITY POLICY BOOT CAMP
Chris Cahill (cahill@email.gwu.edu)

The George Washington University Nuclear Security Policy Boot Camp is taking place virtually from June 14 to June 18, 2021. This event is an exciting opportunity to learn about nuclear security policy directly from leading experts, negotiators, and policy-makers.

GW's Nuclear Security Policy Boot Camp was developed to meet the policy education needs of students in the Nuclear Science and Security Consortium sponsored by the Energy Department's National Nuclear Security Administration. We are pleased to offer a limited number of additional spots in this course to qualified and interested students outside the Consortium.

GW's Nuclear Security Policy Boot Camp provides an intensive one-week foundation in all aspects of nuclear security including the organization of the U.S. Government, the international context, relevant technologies, contemporary policy issues, and R&D. Confirmed speakers include:

- former Deputy Secretary General of NATO Rose Gottemoeller,
- former Nuclear Regulatory Commission Chair Allison Macfarlane,
- former Assistant Secretary of State for Arms Control Verification and Compliance Frank Rose,
- former Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs Andrew Weber, and many more.

The Boot Camp trains doctoral students and post-doctoral fellows in the physical sciences and engineering in the intricacies of nuclear security policy, but master's-level graduate students in these and other disciplines have also attended past sessions. Policy-focused graduate students are also welcome to apply. A limited number of partial scholarships are available to include students with outstanding potential or who belong to groups underrepresented in nuclear security policy.

More information about the Boot Camp can be found here.

Thank you for sharing this information with your students.

A-CINCH PROJECT

Lois Tovey (L.Tovey@leeds.ac.uk)

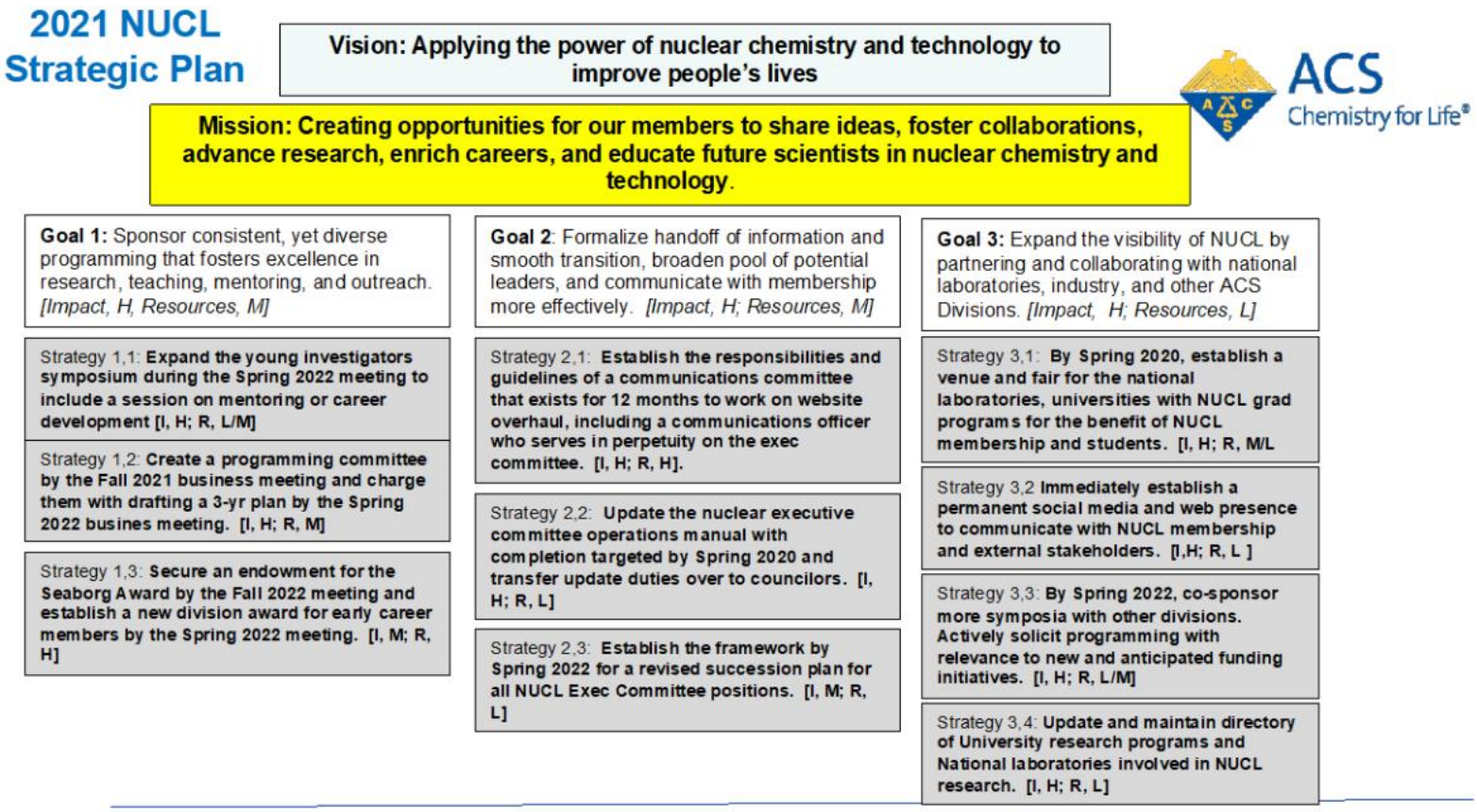
A-CINCH (Augmented cooperation in education and training in nuclear and radiochemistry) is carrying out a career survey that can be found at https://www.cinch-project.eu/news-amp-events. A large volume of responses would be helpful in the development of this project. An overview of the project can be found on the project homepage at https://www.cinch-project.eu/.

NUCLEAR AND RADIOCHEMISTRY JOBS AT ORNL

Lauren Johnson

There are a number of open nuclear and radiochemistry-related positions at Oak Ridge National Laboratory. The jobs can be found at https://jobs.ornl.gov/go/Advanced-Materials-Jobs/4534000/. Contact Lauren Johnson, Talent Acquisition Partner, Physical Sciences at ORNL with any questions via email at johnsonla@ornl.gov.

NUCL Division Strategic Plan



Thermal Separation of Volatile Rare Isotopes from Irradiated Target Materials

Nuclear medicine research on radiotherapeutic methods like radioimmunotherapy, targeted alpha particle therapy and complementary imaging techniques are hampered by the limited availability of extremely rare and relatively short-lived isotopes such as ^{209,211}At, ^{225}Ac, ^{223,224}Ra, ^{213}Bi or ^{212}Pb. They can be produced by irradiating actinide targets with high-energy particles such as the intense 500 MeV proton beam from the world's largest cyclotron at TRIUMF. A wide range of radioisotopes is generated by this process. Separating and purifying isotopes of interest for nuclear medicine research is a challenge. Typically, a purely chemical separation is performed by dissolving the target including its radioactive inventory. An alterative to this method, which requires complex radiochemistry and produces a lot of radioactive waste, is to use thermal chromatography to separate species of varying volatility from an irradiated target. The investigation of thermodynamic and chemical properties that govern the diffusion and effusion of volatile species in this context offers opportunities for a number of thesis projects.

Interested graduate students will have the opportunity to obtain knowledge and receive training on the following subjects:

- Working in a controlled radiation area: The student will receive WHIMS, laboratory and radiation safety training and must obtain the status of a nuclear energy worker.
- Experimental setup: Includes design, assembly and integration of the components and the data acquisition system. The student will gain knowledge about vacuum systems, mass spectrometry and data processing.
- Measurements: The student will perform measurements and modifications of the experimental setup if necessary, learning how to organize, document and execute experiments independently and in a team.
- Online experiments: The goal of the project is to experiment with radioactive samples obtained from ion beam collections or irradiations. The candidate will learn about nuclear spectroscopy techniques and characterize rare isotope beams by their radioactive decay signatures.
- Data analysis: The candidate will have to put experimental results into a theoretical context, describing thermodynamics and chemistry with appropriate models and/or simulations.

Two specific thesis projects are offered:

1. Investigation of the thermal separation of astatine and radon isotopes from actinide targets.

The focus on this research project is ^{211}At, a promising candidate for cancer therapy, and its precursor ^{211}Rn. The release properties of astatine and radon from actinide targets as a function of temperature need to be investigated and understood. Developing an efficient method and designing a suitable apparatus to separate and/or trap these isotopes is the ultimate goal of the project.

2. Investigation of the thermal separation of radium and actinium isotopes.

^{223}Ra and ^{225}Ac are promising isotopes for cancer therapy. Radium and actinium become volatile only at very high temperatures. The main goal of this project is the development of a method for the efficient separation from refractory actinide targets, requiring the investigation of thermodynamic and chemical processes at high temperatures using a vacuum furnace.

For further information and inquiries, please contact

Prof. Corina Andreoiu, SFU, corina_andreoiu@sfu.ca and Dr. Peter Kunz, TRIUMF pkunz@triumf.ca