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Project Title: Student, Postdoctoral Fellow and Invited Speaker Support for American Chemical Society Sub-session on Radiochemistry within the Symposium “New Directions in Isotope Production, Nuclear Forensics and Radiochemistry Supported by the DOE”

Applicant/Institution: Curators of the University of Missouri

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DOE/Office of Science Program Office: MSD Medical Sciences Division (SC-23.2)

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Project Narrative

Project Objectives:

Research, development and utilization of radionuclides to produce radiotracers for applications in biology, industry, homeland security, medicine and environmental studies, etc., are increasing in the U.S. and worldwide. The uses of radionuclides are essential for a wide variety of applications in environmental sciences and in biological sciences where they are used to formulate radiotracers for imaging molecular processes in living systems and for the diagnosis and treatment of diseases.

The Office of Science/Biological and Environmental Research (BER) program within the Department of Energy (DOE) has and continues to support innovative research and educational programs that form the basis for designing, synthesizing and characterizing radiolabeled molecules for applications in biological sciences (including the medical and environmental areas). Exceptional advances have occurred over the past decade in our understanding of the molecular basis of normal and diseased cellular functions that are catalyzing the development of novel molecular imaging radiotracers. The concurrent stellar advancements in developing new PET and SPECT imaging instrumentation and technologies is enabling improved non-invasive *in vivo* imaging of cell and tissue specific molecular imaging radiotracers. Interest in nuclear forensics originated with 9/11 and has been of high importance for homeland security, which is of interest to the DOE, DHS and DOD. The sub-session on Radiochemistry within the “New Directions in Isotope Production, Nuclear Forensics and Radiochemistry Supported by the DOE” symposium at the 240th ACS National Meeting are directly related to and supportive of the mission of the biomolecular and environmental imaging program in DOE/BER.

In order to continue and maximize the growth and enhancement for developing new radiotracers for future biological, medical and environmental applications, it is essential to increase the number of qualified nuclear and radiochemical professionals in the U.S. The critical shortage of scientists trained in radiochemistry and imaging sciences is well documented. Scientific and educational meetings, such as the “New Directions in Isotope Production, Nuclear Forensics and Radiochemistry Supported by the DOE” Symposium and other Division of Nuclear Chemistry and Technology symposia, provide an outstanding opportunity to recruit aspiring researchers and trainees in a venue that can inspire and mentor them to join the next generation of radiochemical scientists.

The ACS national meeting is particularly important as it is the premier chemistry meeting that attracts about 15,000 scientific professionals, postdoctoral fellows, graduate and undergraduate students involved in cutting edge multidisciplinary research from across the globe. National ACS meetings feature presentations organized into topical symposia highlighting recent research advances. By holding the symposium on “New Directions in Isotope Production, Nuclear Forensics and Radiochemistry Supported by the DOE” at the ACS national meeting, a broad participation is expected that will allow for more effective discussion of issues and advances in the field. The symposium will be subdivided into half-day sessions on (1) Isotope Production, (2) Nuclear Forensics, and (3) Radiochemistry. Each session will have an invited plenary lecturer who is prominent in the particular area. Additionally, a combined poster session will be held to encourage cross-area discussions.

The education of the next generation of radiochemists and imaging/nuclear scientists is critical. In 2003, international experts in radiochemistry and nuclear chemistry gathered at the MARC VI conference in Hawaii to discuss the severe shortage of Chemistry Ph.D. graduates with expertise in the field. Noting the decline in student enrollment and the decreasing number of radiochemistry programs over the past 30 years, the panel expressed concern that “if the current trend is not reversed within one generation or less, the knowledge and expertise accumulated so far in an entire scientific sector through immense effort and dedication will be lost.”¹

Radiochemistry is undergoing a renaissance in interdisciplinary areas including medicine, materials, nanotechnology, nuclear forensics and energy. For example, interest in nuclear energy is growing in response to global warming. The field of nuclear forensics has grown significantly since 9/11 in response to potential terror threats and homeland security. Radioactive molecular imaging agents and targeted radiotherapy are revolutionizing molecular medicine. The need for radiochemists is growing, critical, and global. The NUCL Division of the ACS has been involved in various areas of radiochemistry and nuclear chemistry for many years, and is the host of the DOE supported Nuclear Chemistry Summer Schools. This symposium is very timely and will bring together scientists from several areas of radiochemistry and nuclear science to allow for cross-disciplinary discussions and mentoring.

The “New Directions in Isotope Production, Nuclear Forensics and Radiochemistry Supported by the DOE” Symposium at the 240th ACS National Meeting will provide a dynamic setting for students/post-doctoral fellows and other participants with opportunities to present and discuss the ground-breaking research being conducted in the areas of isotope production, nuclear forensics and radiochemistry. This will be a particularly important setting for stimulating cross-disciplinary interactions and learning between scientists with expertise in these three areas. The Symposium will be held in Boston, MA at the 240th ACS National Meeting, where several other symposia will also be hosted by the Division of Nuclear Chemistry and Technology. This will make for a broader audience for the “New Directions in Isotope Production, Nuclear Forensics and Radiochemistry Supported by the DOE” Symposium, and will also give the students and postdoctoral fellows the opportunity to attend some of the other symposia if they are interested and time permits. There will be opportunities for the students and post-doctoral fellows to interact with senior scientist in the various areas of radiochemistry and nuclear science.

It would be difficult (and perhaps impossible) for a significant number of promising young students/postdoctoral fellows working in the radiochemistry and nuclear sciences fields to attend the sub-session on Radiochemistry within the “New Directions in Isotope Production, Nuclear Forensics and Radiochemistry Supported by the DOE” Symposium without financial assistance to cover travel and subsistence expenses. Thus, it is proposed that DOE/BER award \$10,000 to cover the costs of student and postdoctoral bursaries to assist student participants in covering travel and subsistence expenses

related to their study. If this \$10,000 request is funded, proposals from perspective student/trainee participants will be reviewed by the Symposium Awards Committee (Drs. Silvia Jurisson, Michael Welch and Robert Atcher) to select the awardees based on scientific merit and need. Additionally, funds to partially offset the costs to the invited speakers' travel to this meeting will also be awarded. A stipend of at ~\$500 is anticipated for each awardee selected. As the abstract deadline for this meeting is Monday, 5 April 2010, the total number of abstracts submitted is not known at this time. The stipend amount will be adjusted to accommodate as many meritorious applicants as possible. The selection process will include review of their application documents submitted to Silvia Jurisson, their Abstract and results of peer reviewers' comments and a rating of scientific merit. To be eligible for a bursary to attend the Symposium, their Abstract must be accepted for presentation at the Symposium.

References

1. Zeisler, R.; Clark, S. B.; Parry, S. J., Manpower Requirements and Education in Nuclear Science: An International Perspective - a report from the Nuclear Science Manpower and Education Panel. *J. Radioanal. and Nuc. Chem.* **2005**, 263, 103-106.