Tenner honored with Department of Homeland Security Early Career Award

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Travis Tenner of the Lab's Nuclear and Radiochemistry group has received a Department of Homeland Security (DHS) Early Career Award. The DHS has funded Tenner for research in technical nuclear forensics. Tenner began working with secondary ion mass spectrometry (SIMS) while he was a graduate student at the University of Minnesota, where he received a doctoral degree in geology. He joined Los Alamos in 2015, applying his accumulated SIMS knowledge to the study of nuclear forensics.

Tenner's achievements

Tenner's DHS research project began in 2017 and is titled, "Optimizing the characterization of pre-detonation material and post-detonation debris particles by large geometry-SIMS for rapid-screening nuclear forensic analysis." Determining actinide isotope ratios from pre-detonation material and post-detonation debris particles can reveal important data for nuclear forensic investigators. This capability can be applied to interdicted materials, failed nuclear device scenarios, radiological dispersal devices, and post-nuclear detonation debris samples. In addition, light-isotope ratios of post-detonation debris particles (*e.g.*, high-explosive soot) from an radiological dispersal device or failed nuclear device are useful because expected fractionations can reveal certain performance characteristics of the device. However, it is not currently well understood if secondary ion mass spectrometry (SIMS) as a rapid screening technique has the fidelity to distinguish isotope signatures from individual particles.

Tenner will use the Lab's large geometry SIMS (LG-SIMS) to investigate and document sample preparation techniques that control the dispersion of uranium and graphite reference materials onto a sample surface. He and his co-workers will evaluate which conditions of sample dispersion and SIMS ion beam characteristics provide the best balance of isotope image fidelity and analytical precision. The overall goal of the project is optimal, rapid, isotope screening of "real-world" pre-detonation and post-detonation particles consisting of uranium-bearing and/or graphitic materials.

The Lab purchased the LG-SIMS instrument using Institutional Investment funds for use in support of a wide variety of programs. The capability to examine radiological samples in a SIMS instrument opens new research avenues.

About the Early Career Award

The award aims to encourage research in the field of nuclear forensics and to help young researchers become established in this vital national security research area. Projects can focus on either pre- or post-detonation science. An interagency panel selects awardees. The research award is $300 K a year for two years.