Abstract

Isaac D. Simmonds

J. David Robertson - Dissertation Advisor

Radiochemical and Analytical Methods of Analysis of Radiological Dispersal Devices

The events on September 11th 2001 and subsequent attacks in America and around the world have brought a renewed interest in the nation's security including the concern over the use of a nuclear or a radiological dispersal device (RDD). Research utilizing NAA and ICP-MS has been done in two separate projects in order to help address some of these concerns. A research assistantship from Savannah River National Laboratory was granted in order to identify the impurities and isotope ratios of ^{192}Ir sources (chapters 2-4). An electrochemical dissolution method of the iridium was developed and used for sample preparation for ICP-MS analysis. ICP-MS analysis was then used to identify and quantify impurities and isotope ratios in iridium from various sources. The second research project has developed a series of lanthanide phosphate based nanoparticles for use as tagging and tracking agents (chapters 5-7). The composition of the nanoparticles were varied to provide a unique signature that can be rapidly and precisely measured in the field via neutron activation analysis. The nanoparticles could be used as a real-time in the field method for tracking and identifying materials such as explosives in a post detonation scenario.