National Security Education Center

A CONSORTIUM OF LANL INSTITUTES

UNCLASSIFIED

Joint Chemistry Division and Information Science & Technology Seminar Speaker Series

Klaus Mayer, European Commission – Joint Research Centre, Institute for Transuranium Elements

Nuclear Forensic Science--Revealing Information Inherent to Nuclear Material for Nuclear Safeguards and Nuclear Security Applications

Wednesday, September 26, 2012
3:00 - 4:00 PM
TA-3, Bldg. 0207, Room 216,
Jemez/Cochiti Rooms (Study Center)

Abstract: The challenges in nuclear safeguards and in nuclear security have significantly changed over the last decades. On the one side nuclear safeguards evolved from the simple verification of declared amounts of material to a more information driven approach based on the verification of absence of undeclared nuclear material and undeclared nuclear activities. On the other side we are confronted with nuclear material out of regulatory control, such as material intercepted from illicit trafficking or contaminated scrap metal.

Consequently, new sample types such as particle samples, environmental type materials, process materials or seized nuclear material need to be thoroughly analysed. Also the objectives of nuclear material analysis have changed and today measurement results need to offer information on the history of the material and on the consistency of measurable material properties (signatures) with declared processes and operations of a nuclear facility. The parameters to be investigated range from isotopic composition, microstructure, chemical impurities to decay products. This triggered the transfer of analytical techniques from the environmental area, from materials science or from the geological or cosmological area to the nuclear analytical community.

The development and application of more investigative (radio-) analytical methodologies is required and more thorough, interpretative and comparative evaluation of results needs to be performed for providing the information requested. The discipline which makes use of these analytical techniques is referred to as nuclear forensic science. It aims at providing investigative leads to law enforcement and at providing clues on the origin and intended use of nuclear or other radioactive material involved in illicit incidents. It benefits from the wealth of information inherent to the material. Specific applications, possibly in combination with only minute amounts of sample call for methods of high sensitivity, low detection limits, high selectivity and high accuracy. The selection of the method or combination of methods is done according to the sample and according to the information required. These new analytical challenges and the response will be illustrated using examples from recent work at ITU.

Biography: Klaus Mayer obtained his Ph.D. work in 1987 in the field of radiochemistry and analytical chemistry from the University of Karlsruhe. He then worked for two years at the Institute for Transuranium Elements as post-doctoral researcher where he analysed dissolution residues from reprocessing of nuclear fuels and contributed to the program for transmutation of minor actinides. From 1990-1996, he was working for the European Commission at IRMM Geel (Belgium) on actinide isotopic reference materials, high accuracy mass spectrometric measurements of U, Pu and Th, the organization of an external quality control programme for nuclear material measurements and the coordination of support activities to Euratom safeguards office and to IAEA. In 1996, he started working at ITU Karlsruhe on the development and application of destructive analytical methods for nuclear safeguards purposes. He was in charge of the conception and installation of two safeguards on-site laboratories at the large reprocessing plants in La Hague (F) and Sellafield (UK). From 1997 to 2010 he chaired the ESARDA Working Group on Destructive Analysis. Today, he is in charge of ITU's activities on combating illicit trafficking and nuclear forensics. This includes method and signature development, actual case work on seized material, cooperative activities, as well as training and education. Since 2004 he is co-chairman of the Nuclear Forensics International Technical Working Group (ITWG). He is the author of more than 150 scientific publications in the field of nuclear material analysis for safeguards and nuclear security applications, including peer-reviewed articles, book chapters and conference papers.

Los Alamos NATIONAL LABORATORY EST.1943

UNCLASSIFIED

For more information contact the technical host Lav Tandon, tandon@lanl.gov, 665-5458 or Elaine Roybal, elaine@lanl.gov, 667-4458.
Hosted by the Information Science and Technology Institute (ISTI) and Chemistry Division (C)