

Nuclear Engineering Seminar

Dr. Linda Nie,

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Wednesday, September 16 2026

3:30 pm | WTHR 200

Neutron and X-ray Technology Development to Study Metal
Exposure and Human Health

Abstract

The broad applications of metals in industry, agriculture, and other fields have dramatically increased metal exposure to human population over the last several decades. Studies have linked metal exposures to various health effects and diseases. Many metals accumulate in storage and/or target organs in human body and induce adverse health effects. Accurately quantifying metals or trace elements in these organs provides critical information to study metal exposure and human health. This presentation will highlight three analytical techniques developed in Dr. Nie's lab to measure metals and trace elements in vivo in human bone and soft tissue, and ex vivo in mouse and human brain. It will illustrate three generations of deuterium-deuterium (DD) neutron generator based in vivo neutron activation analysis systems and methodologies, along with two in vivo x-ray fluorescence approaches. The talk will also briefly discuss the use of synchrotron x-ray fluorescence for investigating metal distributions in the brain and their relevance to neurodegeneration.



Dr. Nie is a Professor of Medical and Health Physics in the School of Health Sciences at Purdue University. She is also a courtesy professor in Purdue School of Nuclear Engineering. Dr. Nie is an expert in the field of Applied Nuclear Physics, where she applies nuclear technologies in interdisciplinary and multidisciplinary fields such as environmental/occupational health, public health, medicine, and biology. She has been developing novel x-ray and neutron technologies on human body composition study, toxicology study, disease diagnosis, and cancer treatment. She has been collaborating with over a dozen of research groups nationally and internationally to apply the technologies developed in her lab to study metals and health. She published over 100 papers in the related fields. Dr. Nie is associate editor for the Applied Radiation and Isotopes journal and is an Editorial Board member for Physiological Measurement. She is also a council member for the International Society of Trace Element Research in Humans (ISTERH).