LECTURE

VISITING PROFESSOR PROGRAMME

Dr. Lu Yang

National Research Council Canada
1200 Montreal Rd., Ottawa, ON, Canada

will deliver a lecture titled:

Applications of MC-ICPMS for high accuracy and precision isotope ratio measurements at NRC

DATE: Thursday, 5 September 2019 | 10.00
VENUE: CNBCh UW, sem. room: 0.38

ABSTRACT: High precision and accuracy isotope ratio measurements have played central role in many disciplines from studies of early solar system formation and age dating in geoscience to studies in medical science, nuclear and forensic sciences, and environmental science etc.1-2 Currently multi-collector inductively coupled plasma mass spectrometry (MC-ICPMS) is a powerful tool for such measurements, providing the instrumental isotopic fractionation/mass bias is properly dealt with, which is not trivial.3 In addition to commonly believed mass-dependent fractionation (MDF), mass-independent fractionation (MIF) has been reported in MC-ICPMS itself for many elements including Nd4-7, Ce5, W8, Sr5, 9, Ge10, Pb10, Hg10, Si11, Ba12, Os13 and Hf14-15, which has a huge impact on the choice of mass bias correction models. Most applications of isotope ratio measurements rely on SI traceable isotopic standards to calibrate the instruments. Unfortunately, many elements still lacks SI traceable isotopic standard and measurements, thus, researchers are forced to use different commercial standard solutions as delta zero to report isotope ratios in a delta notation (δ=(Rsample/Rstandard-1)*1000), making isotope ratios measured world-wide incomparable. In the last decade, many international Metrology Institutes including NRC have made significant efforts in the development and the certification of isotopic standards. Among many mass bias correction models, without rely on isotopic standard of the analyte, two state-of-the-art mass bias correction models2 are capable of correcting both MDF and MIF. One is the primary method, so called full gravimetric isotope mixture (FGIM) model, which is based on use of all near–pure isotopes of an element (e.g., all four isotopes of 204Pb, 206Pb 207Pb and 208Pb) with known chemical purities to prepare gravimetric mixtures, without rely on any existing isotopic standards and prior knowledge of isotopic composition of the near-pure isotopes. The second model is the optimized regression model and it presents as an alternative/secondary method for absolute isotope ratio measurements. This method allows calibrating isotope ratios of an element using a known isotope ratio of another element without assuming that the two elements must necessarily display identical mass bias (they do not). Recent research results from our group will be presented and discussed in details in this lecture.

Research field:
Her research focuses on the development of the most accurate and precise methodologies for the determination, speciation and isotopic analysis of trace elements using ICP-MS and MC-ICP-MS. The isotopic measurements for mercury, germanium, indium, iridium, osmium, hafnium and lead from her lab have been adopted by IUPAC as the best available isotopic composition measurements in the 2013, 2017 and 2019, and the standard atomic weights of mercury, germanium, iridium and hafnium are based on her lab results. She has published over 125 peer reviewed publications and a book chapter, with H-index of 33.

University of Warsaw
Biological and Chemical
Research Centre