Metrological and SI traceable measurements by ICPMS and MC-ICPMS

Lu Yang
National Research Council Canada, 1200 Montreal Rd, Ottawa, Ontario, Canada, K1A 0R6.

ABSTRACT: Metrology, Science of measurement and its application, plays a vital role in today’s world. It underpins almost every aspect of our everyday lives, such as industry and trade, quality of life, science and innovation. Metrology includes all theoretical and practical aspects of measurement, whatever the measurement uncertainty and field of application. Metrology in chemistry has improved significantly in the last two decades as a result of efforts to achieve measurement comparability among countries. Comparability is achieved on a global scale when results are traceable to the same long-term stable measurement standards [ideally, the International System (SI) of Units] and continuously validated by regular inter-comparison exercises involving National Metrology Institutes (NMIs) through the auspices of the CCQM (Consultative Committee for Amount of Substance – Metrology in Chemistry) of the International Bureau of Weights and Measures (BIPM). NMIs disseminate traceability through calibration standards and matrix Certified References Materials (CRMs).

Characterization of CRMs demands utilization of the most accurate, precise and SI traceable measurement methodologies available. Inductively couple plasma mass spectrometry (ICP-MS) is one of the most popular techniques for the trace elements measurements. Metrology in the determination of trace elements has advanced and matured enough to provide SI traceable measurements. Despite the multi-collector (MC) ICPMS has become a powerful research tool for the determination of isotope ratios with a wide range of applications, very few SI traceable and absolute isotope ratio measurements by MC-ICPMS is available. This lecture will highlight metrological principles and rules adapted at National Research Council Canada to achieve SI traceable measurement results using ICPMS and MC-ICPMS techniques.

REFERENCES