



Contribution ID: 457

Type: **Poster**

## The Micro-Optical Ring Electrode: A Sensor for Multiple Actinide Ions Monitoring

*Thursday, 17 May 2018 18:00 (15 minutes)*

We present on the development of the Micro-Optical Ring Electrode (MORE) for the analysis of trans-uranium elements in aqueous mixtures. The MORE is a photo-electrochemical device based on a ring microelectrode that uses the insulator interior to the ring as a light guide. This single device exploits the unique photophysical and electrochemical properties of multiple analytes present in mixtures to quantify them. Our study aims to develop a protocol for the analysis of ions of uranium, neptunium and plutonium, which are most relevant to the nuclear industry, especially in the areas of decommissioning and fuel-reprocessing, where speedy and safe identification of radioactive contaminants is essential.

The technique offers a number of advantages over traditional methods in the area of radiochemical analysis such as real time monitoring in-situ, reduced radiation dose impact to the analyst as a result of greatly reduced sample handling and preparation, improved analysis times allowing quick decision making and a much reduced cost (e.g. compared to ICP-MS and Scintillation counting).

Here we present results of our study on successfully generating photocurrents from uranium containing solutions, and describe the response of the sensor as a function of wavelength of illumination, concentration of sensitizer and scavenger species, and include a discussion of limits of detection and interference from additional analytes. The effect of the MORE's surface finish on photocurrents will also be discussed.

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**Session Classification:** Poster NFC

**Track Classification:** Chemistry of Nuclear Fuel Cycle, Radiochemical Problems in Nuclear Waste Management