

F24.033 Challenges and opportunities in assessing arsenic and uranium in water, soil, plants, and food.

Overview

There is a vast region of North America, including Chihuahua in Mexico and Arizona in the United States, where it is a natural occurrence of uranium. Anthropogenic activities or geographical conditions sometimes exacerbate concentration levels in water and soil. Usually, there is a spatial relationship between uranium and arsenic in well water. Drinking this water or being exposed to this water or soil irrigated with this water implies a substantial human health risk.

Inductively coupled plasma mass spectrometry (ICP-MS) is a powerful technique widely used to assess the concentration of these two elements in water and soil. However, it requires a laborious sample preparation to avoid spectral interferences. Additionally, the operative requirements of ICP-MS make it impossible to test on-site. Here we aim to implement and develop instrumental methods based on Total Reflectance X-Ray Fluorescence (TXRF), Voltammetry (CV, LSV, DPV), and Surface Enhanced Raman Spectroscopy (SERS) to complement our current instrumental capabilities. Using these methods, we should be able to screen extensive areas and concentrate ICP-MS analysis on areas of interest previously detected during on-site screening.

What the student will DO and LEARN

The selected undergrad researcher will:

- Generate and manage a reference database with updated literature. In doing so, the selected undergrad researcher will learn how to navigate different scientific databases and use reference management software.
- Collaborate in writing scientific publications (a mini-review in particular) for peer-reviewed journals. In doing so, the selected undergrad researcher will learn how to ethically manage information, data, and references and communicate effectively with a defined scientific audience.
- Develop and implement at least one instrumental method for arsenic or uranium assessment. In doing so, the selected undergrad researcher will learn different instrumental methods, such as voltammetry, ICP-MS, SERS, and TXRF, and will get training in the required equipment.

Additional benefits

Coauthorship in at least a mini-review in a peer-reviewed journal indexed in

JCR

Additional qualifications

This position is partially-funded by NAU's LSAMP program, so acceptance to this position is contingent upon [LSAMP-eligibility](#)

Time commitment

8 hrs/week for 15 weeks