

RESOLVING THE UNRESOLVED: ONLINE MICRODIALYSIS COUPLED TO ICP-QQQ FOR THE SIMULTANEOUS SAMPLING AND ANALYSIS OF DISSOLVED ELEMENTS IN SOIL SOLUTION

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Assessing rapid chemical-elemental reactions in soils is significantly inhibited by the spatial and temporal resolution of current sampling techniques [RhizonTM samplers, diffusive gradients in thin films (DGTs)]¹. Soil chemistry is typically investigated over hours-days-weeks and with poor sampling density; the vast majority of reactions occur within seconds-minutes. Microdialysis (MD) is a new technique in the field of soil science that uses small probes to sample compounds dissolved in soil solution, with minimal disturbance to the external environment². Initially developed for use in neuroscience, MD has the potential for translation to environmental geochemistry to define soil chemical/physical parameters, and better inform predictive models for soil-to-plant transfer of potentially harmful elements (PHEs) or essential nutrients. One considerable experimental challenge for MD is balancing the target analyte recovery efficiency with the sample volume required for the analytical chemistry technique, which can significantly affect how often elemental speciation changes and soil fixation events can be measured³. To overcome this challenge, we have begun development of a novel integrated online MD sampling and analysis technique, through direct coupling of MD probes with triple quadrupole inductively coupled plasma mass spectrometry (ICP-QQQ) using a microflow total consumption nebulizer with no additional modifications. This poster will present the initial setup, optimisation and application of the technique to the sampling and analysis of multiple elements in soil solution, alongside future perspectives on how information gained from this promising technique can contribute to the management of global societal and agricultural issues (e.g. nutrient supply to staple crops, contaminated land remediation)

REFERENCES

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