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Type: Oral

## High-Resolution Macro ATR-FTIR Chemical Imaging Capability at Australian Synchrotron Infrared Microspectroscopy (IRM) Beamline

Thursday, 25 November 2021 12:00 (15 minutes)

This presentation aims to provide a summary on technical aspects and applications of our synchrotron macro ATR-FTIR microspectroscopy, unique to the Infrared Microspectroscopy (IRM) beamline at ANSTO–Australian Synchrotron.<sup>1</sup> The device was developed by modifying the cantilever arm of a standard macro-ATR unit to accept Ge-ATR elements. Coupling synchrotron-IR beam to the Ge-ATR element ( $n=4$ ), reduces the beam focus size by a factor of 4 (improving lateral resolution), and the mapping step size by 4 times relative to the stage step motion. As a result, the macro ATR-FTIR measurement at our IRM beamline can be performed at minimum projected aperture (sampling spot size) of 1-2  $\mu\text{m}$  using a 20x objective, and minimum mapping step size of 250 nm, allowing high-resolution chemical imaging analysis with the resolution limit beyond those allowed for standard synchrotron-FTIR transmission and reflectance setups.

The technique has facilitated many experiments in a diverse range of research disciplinary. Here, there will be presentations based on macro ATR-FTIR technique in archaeology, electrochemistry (battery), biomedical and forensic sciences. Apart from these, we will provide additional applications in the fields of food and pharmaceutical science,<sup>2-4</sup> single-fibre analysis,<sup>5-6</sup> and dentistry.<sup>7</sup>

### References:

- [1] J. Vongsvivut, et al., Analyst 144, 10, 3226-323 (2019).
- [2] A.P. Pax, et al., Food Chemistry, 291, 214-222 (2019).
- [3] Y.P. Timilsena, et al., Food Chemistry, 275, 457-466 (2019).
- [4] D.M. Silva, et al., Journal of Colloid and Interface Science, 587, 499-509 (2021).
- [5] S. Nunna, et al., Journal of Materials Chemistry A, 5, 7372-7382 (2017).
- [6] C. Haynl, et al., Scientific Reports, 10, 17624 (2020).
- [7] P.V. Seregin, et al., International Journal of Molecular Sciences, 22, 6510 (2021).

### Presenter Gender

Woman

### Do you wish to take part in the Student Poster Slam

### Condition of submission

Yes

### Students Only - Are you interested in AINSE student funding

## Level of Expertise

Expert

## Pronouns

She/Her

## Which facility did you use for your research

Australian Synchrotron

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Session Classification: Instruments & Techniques

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