ANALYTICAL SEMINAR

New Approaches to Characterise the Surface and Bulk Composition of Picoliter Droplets

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Aerosols are unique microcompartments central to areas as diverse as climate change and air pollution, disease transmission, and chemical synthesis. Resolving their roles in each of these areas is challenging. For instance, the surface composition of aerosol droplets is key to predicting cloud droplet number concentrations, understanding atmospheric pollutant transformation, and interpreting observations of accelerated droplet chemistry. However, direct measurement of the surface properties of aerosol droplets is challenging, even though such measurements are necessary, as surface-bulk partitioning is strongly affected by the droplet's surface area-to-volume ratio. In this presentation, I will discuss new advances to characterise the equilibrium and dynamic surface properties of picoliter volume droplets, gaining important insights that bear directly on our understanding of how cloud droplets form in the atmosphere and how chemical reactions may proceed in finite-volume systems. I will also describe a new mass spectrometry approach enabling sensitive, high throughput chemical analysis of picoliter droplets, which will enable more robust studies of the factors governing chemical reactivity in microcompartments.

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