In-situ studies of the electrode/electrolyte interface using XPS

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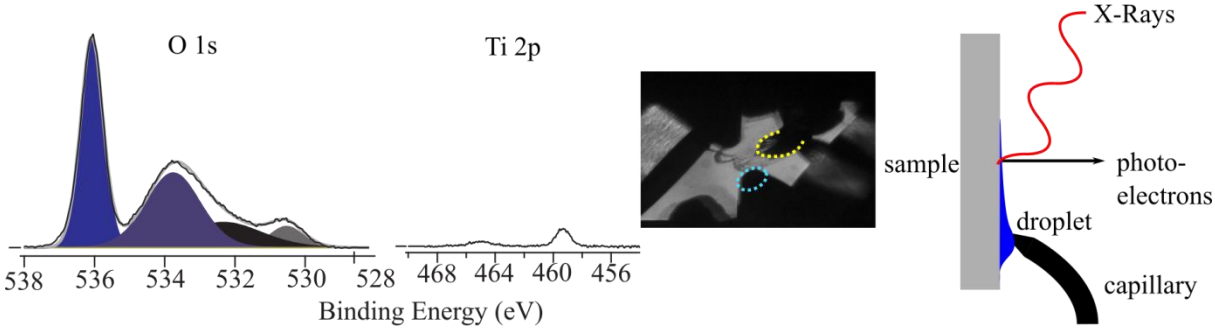
The ability to study the electrode/electrolyte interface in situ is essential to gain fundamental understanding of electrochemical processes. A poor understanding of surface chemical processes at electrodes is a key bottleneck in the development of many energy technologies -e.g. alternative battery technologies or water splitting catalysts. X-Ray Photoelectron Spectroscopy (XPS) is one of the most powerful probes of surface chemistry available but addressing the electrode/electrolyte interface with XPS is a major technical challenge as it is buried by the electrode on one side and the electrolyte on the other - making detection of photoelectrons from this interface very difficult.

I will present an approach to addressing the electrode/electrolyte interface in-situ using Near-Ambient Pressure XPS by producing an ultrathin wetting layer on the sample surface, through which we can directly probe the electrode/electrolyte interface in-situ. We do this by introducing a droplet of electrolyte onto the sample, offset from the analysis area by a few millimetres [1]. This “offset droplet” approach has the advantages of being applicable to virtually any sample and having a short diffusion length from analysis area to the bulk droplet.

I will outline the capabilities and the challenges of this technique and present some preliminary results applying it to the study of model electrocatalysts and battery electrodes.



References:

[1] Booth S. G., Tripathi A. M., Strashnov I., Dryfe R. A. W. and Walton A. S. J. Phys.: Condens. Matter **29** 454001 (2017)