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Ambient pressure X-ray absorption spectroscopy at the In situ and Operando Soft X-ray Spectroscopy (IOS) beamline at NSLS-II

Content

Ambient pressure X-ray absorption spectroscopy (AP-XAS) is a powerful complementary technique to ambient pressure X-ray photoelectron spectroscopy (AP-XPS), providing detailed electronic structure information that often cannot be obtained by AP-XPS alone. At the In situ and Operando Soft X-ray Spectroscopy (IOS/23-ID-2) beamline at the National Synchrotron Light Source II (NSLS-II), Brookhaven National Laboratory, AP-XAS experiments can be performed in conjunction with AP-XPS in the same endstation for studying gas-solid interfaces, or in a separate dedicated endstation for studying liquid-solid interfaces. I will show examples of research that have benefitted from the AP-XAS capabilities at IOS. First is operando AP-XAS of gas-solid interfaces in partial electron yield (PEY) mode to study the surface oxidation of perovskites under electrochemical bias. The second is AP-XAS of gas-solid interfaces in partial fluorescence yield (PFY) mode, which increases probing depth compared with electron-based detection, to study buried interfaces in layered materials. I will also discuss our liquid electrochemical cell setup for studying liquid-solid interfaces using both PFY and total electron yield (TEY) modes. Finally, I will give an overview of the future plans for multi-modal ambient pressure spectroscopy at IOS.

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