

## **“Playing to strengths : the advantages of using boron doped diamond electrodes in electrochemical research”**

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In this talk I highlight the unique features of boron doped diamond as an electrode material, enabling applications not possible with other electrodes. BDD is corrosion resistant and mechanically strong, water oxidation on BDD goes via the hydroxyl radical route rather than oxygen evolution making it extremely useful as an electrode material for the generation of oxidizing radical species which are able to breakdown pollutants in advanced electrochemical oxidation processes. Application in the space of the environmental pollutant PFAS removal is demonstrated. The ability to determine radical identity is shown via electrochemical EPR and opportunities for improvement highlighted. With advances in the processing of diamond and BDD, we show it is now possible to thin BDD electrodes to produce < 50 nm thick electron beam transparent electrodes, which retain the properties of BDD electrodes; such electrodes provide platforms for electrochemical transmission electron microscopy enabling the observation of single atoms and dynamics (using an identical location method) associated with electrochemical growth/dissolution and electrocatalyst degradation.