

**Investigations of the Role of Surface
Composition in Controlling the Performance
of CVD Diamond Electrodes**

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Electrochemical processes at boron-doped CVD diamond films are being widely explored for the development of a range of electroanalytical and electrocatalytic applications. Freshly grown CVD films which are used in such applications are normally terminated with chemisorbed hydrogen, but such surfaces are often chemically unstable and thus become chemically modified in electrochemical reactions. The changes this brings about in electrochemical performance are as yet fairly poorly understood. In this paper, we therefore examine a range of electrochemical processes, and demonstrate effects that arise as a result of changes in the nature of the diamond surface.

The systems surveyed include the electrodeposition and electrochemical stripping of noble metals, the electrochemical oxidation of chemical dyes and organic pollutants and processes in abrasive stripping voltammetry. The influence of power ultrasound is also studied. The surface chemical modifications that occur and we characterise, include surface dehydrogenation, surface oxidation, surface activation due to the incorporation of chemically active constituents and surface passivation due to the presence of insulating deposits. These modifications are shown to produce a dramatic effect on the electrochemical properties observed, and thus need to be taken into account when investigating the performance of CVD diamond electrodes.