

Stripping Voltammetry of Metals at Diamond Electrodes - J. Foord, W. Hao, K. Eaton, and A. Chatterjee (University of Oxford)

Diamond electrodes have applications in electroanalysis, since the wide electrochemical potential window, chemical robustness, electrochemical reproducibility and low background currents are very useful advantages, which can be exploited in particular instances. Numerous papers have reported on the detection of heavy metals in aqueous solutions by stripping voltammetry using diamond electrodes. Since the deposited metal can quite significantly affect the electrochemical characteristics of the diamond electrode employed, complications arise in analysis of solutions containing more than one metal species, which can be deposited simultaneously. In this paper, we therefore investigate the analysis of a range of solutions containing more than one metal ion.

Detailed measurements using voltammetric techniques, microscopy and photoelectron spectroscopy are reported for solutions containing both Ag and Pb. Although these elements are virtually immiscible in the bulk phase, significant interaction between the elements is observed during co-deposition. This results in the observation of new surface chemical forms in cyclic voltammetry, and significantly complicates attempts to determine analytically the ionic concentrations in solution. XPS measurements are carried out which identify some of the effects involved. Similar studies are reported for other mixed metal systems, which highlight difficulties arising in the use of stripping voltammetry in this type of application.