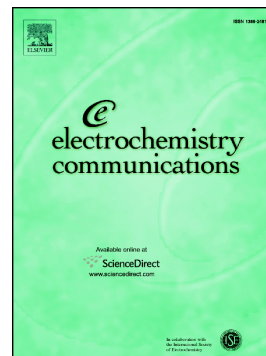


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Exploring the suitability of different electrode materials for hypochlorite quantification at high concentration in alkaline solutions

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Abstract

A comparison of the electrochemical performance of noble metal, sp^2 - and sp^3 -carbon electrodes towards the reduction of concentrated hypochlorite (ClO^- ; 0.02 M – 1.88 M), an alkaline (pH ~ 13) and chemically oxidising solution, is presented. Boron-doped diamond (BDD) gave no discernible electrochemical response whilst all other electrodes showed an electrochemically irreversible cathodic response in the following order (most facile electron transfer): Pt > Au > edge plane pyrolytic carbon (EPPG) \approx sp^2 -containing BDD > basal plane (BP) sp^2 carbon > glassy carbon \approx highly ordered pyrolytic graphite. Reduction at sp^2 -BDD occurred at a similar potential to EPPG, but with much lower currents, suggesting edge-plane-like sites are the active sp^2 sites in this sp^2 -BDD, but at much lower surface coverage than in EPPG. Finally, both EPPG and sp^2 -BDD showed linear current versus $[ClO^-]$ responses over the concentration range 0.02 M–1.41 M ($R^2 > 0.995$).

Keywords: Free chlorine, hypochlorite, boron doped diamond, sp^2 carbon, edge plane pyrolytic graphite

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