

A comparative study of preparation and characterization of lead dioxide film on titanium substrate by electrochemical method

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New and emerging science and technology, for instance in electrochemical power sources, waste water treatment and dualactivation techniques, is supporting fresh interest in the fundamental properties of solid oxide electrodes, such as lead dioxide (PbO₂) electrode. In this paper, lead dioxide electrode with nafion polymers as the stabilizer was studied by using different coating process. Four types of lead dioxide electrodes have been prepared by electrochemical pretreatment of titanium substrates and different electro-deposition process on titanium substrates. The electrode types included direct electrodeposited PbO₂ film on the titanium substrate (Ti / PbO₂), dip-coating of nafion film on the surface of Ti / PbO₂ (Ti / PbO₂ / Nafion), reduction coating of nafion on the titanium substrate then electrodeposited of PbO₂ film (Ti / Nafion / PbO₂), and electrodeposited of PbO₂ with nafion particles (Ti / Nafion + Aniline + PbO₂). The prepared electrode properties, such as scanning electron microscope (SEM), voltage/current curve (V-I), cyclic voltammetry (CV) experiment, electrode impedance, and electrochemical stability were used to characterize the electrodes.