An RDE Research on the Preparation Process of β -PbO₂-CoO_x Composite Coatings

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The electrosynthesis of cobalt-doped lead dioxide in an acidity bath has been studied using PARSTAT2273 electrochemical workstation with rotating disk electrode (RDE) and β (Beta)-PbO₂-CoO_x composite coatings were obtained by means of anodic galvanostatic polarization. The concentrations of Co²⁺ and Pb²⁺, pH, temperature and rotation velocity of the electrode effects on deposition behavior have been investigated. The amounts of PbO₂ deposited on the electrode surface increase with increasing concentrations of Co²⁺, Pb²⁺, H⁺ and temperature within a certain range. There are only one main peak oxide peak (Pb²⁺→PbO₂) and reduction peak (PbO₂→Pb²⁺) with both anodic and cathodic scan in the cyclic voltammetry curves. The steady-state measurements show that the most suitable deposition current density is 6 mA/cm². Surface analysis by SEM and XRD reveals that the Co-doped PbO₂ has more uniform morphology and smaller crystals size than pure PbO₂. The E-t curves show that Co²⁺ added into the original plating bath brings on a large amounts of nucleation points for β -PbO₂ deposition.

Keywords: β -PbO₂, RDE, Cobalt, Composite coating, Electrosynthesis

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