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Preparation of Ti/PbO_2-ZrO_2 Composite Anode for Zn Electrowinnig

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To improve the oxygen evolution electrocatalytic activity of Ti/β-PbO_2 in zinc electrowinning, the Ti/β-PbO_2-ZrO_2 electrodes were prepared by anodic oxidation electrodeposition in the lead nitrate plating bath containing ZrO_2 nanoparticles. It was found that the addition of ZrO_2 nanoparticles can obviously increase the effective area of the electrode surface, thus increasing the number of electrode material surface active sites, and has significantly improved the effect of the electrode materials on the electric catalytic activity. SEM and XRD were used to characterize the microstructure and phase composition of the active layer. The electrochemical methods elucidate the role of anode electrolytic zinc composite materials in the oxygen evolution electric catalytic activity. Through the measurement and analysis of cyclic voltammetric curves, we thoroughly discuss the anode composite materials used for electrical deposition of zinc anode and the addition of ZrO_2 activity of nanoparticles on the electrode surface active sites. The results show that for the titanium base after doping ZrO_2 nanoparticles with lead dioxide in the electrolytic zinc liquid, the oxygen evolution potential decreased by approximately 0.28 V, and the electrode surface active surface area increased, with the electrochemical active surface charge number and double electric catalytic activity increasing significantly. The anodic polarization curves show that when doping ZrO_2 nanoparticles into the Ti/β-PbO_2-ZrO_2 electrodes, the oxygen evolution potential decreased by approximately 0.28 V, and the cyclic voltammetric curves show that the relative surface area of the Ti/β-PbO_2-ZrO_2 composite electrodes is approximately two times larger than that of the Ti/β-PbO_2 electrodes.

Keywords: lead dioxide; ZrO_2 nanoparticles; active sites; oxygen evolution electrocatalytic activity

FULL TEXT