Corrosion Behavior of Au Coating on 316L Bipolar Plate in Accelerated PEMFC Environment

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The material Au has high conductivity and good corrosion resistance, which is benefit for proton exchange membrane fuel cells (PEMFC) application. In order to evaluate the corrosion performance of Au coating for PEMFC applications, the electrochemical corrosion behaviors in 0.5 M H₂SO₄ with 10 ppm of fluoride ions at 80 °C were investigated by potentiodynamic polarization (PP) tests. And the corrosion characteristics were characterized by using SEM, EDX, XRD and XPS methods. The results showed that as the experiment time increases from 0 h to 48 h, the self-corrosion current increases from 1.716×10^{-5} A/cm² to 2.243×10^{-4} A/cm². As the reaction develops, the corrosion rate of the Au coating in accelerated PEMFC environment increases. Combined with the morphologies and corrosion products analysis, and also electrochemical impedance spectroscopy (EIS), the corrosion mechanisms were discussed.

Keywords: Au Coating, Corrosion, Electrochemical, PEMFC

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