

Effects of Catalyst Material and Loading Amount on SO₂ Oxidation at the Anode of Electrolytic Cell for Hybrid Sulfur (HyS) Hydrogen Generation

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Effects of catalyst material and loading amount on SO₂ oxidation reaction at the anode of electrolytic cell for hybrid sulfur hydrogen generation were investigated in SO₂-saturated 50 wt% H₂SO₄ solution. For this purpose, Pt/C and Pd/C catalysts were used and suspension which is mixture of catalyst, 5 wt% Nafion, ethanol and D.I water was coated on the glassy carbon disk electrode, followed by drying under air atmosphere at 80°C for 2h. Prior to electrochemical experiments, catalysts were characterized by TEM. The cyclic voltammograms(CVs) were first obtained in deaerated 0.5 M H₂SO₄ solution to evaluate electrochemical active area for SO₂ oxidation reaction. From the analysis of CVs, it was found that electrochemical active area increased as catalyst loading amount increased. In order to determine optimum catalyst loading amount the linear sweep voltammetry was implemented as a function of catalyst loading amount. Finally, the CVs were measured in SO₂-free and SO₂-saturated 50 wt% H₂SO₄ solutions to investigate the mechanism of SO₂ oxidation reaction.