

Formation Mechanism of Macroporous Cu/CuSe and Its Application as Electrocatalyst for Methanol Oxidation Reaction

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Abstract : The single-step solvothermal method is used to prepare Cu/CuSe as an electrocatalyst for methanol electro-oxidation reaction (MOR). 1,3-butane-diol is selected as a reaction medium, whose viscosity and complex formation with Cu(II) ions dictate the catalyst morphology. The catalyst has a macroporous structure, which is composed of nanoballs with a high purity, crystallinity, and uniform morphology. The electrocatalyst is excellent for MOR, as it delivers a current density of 37.28 mA/mg at a potential of 0.6 V (vs Ag/AgCl) in the electrolyte of 1 M KOH and 0.75 M methanol at a 50 mV/s scan rate under conditions of cyclic voltammetry. The catalyst also shows good stability for 3600 s with negligible charge transfer resistance and a high electrochemical active surface area (ECSA) value of 0.100 mF/cm².

Keywords : MOR, copper selenide, electrocatalyst, energy application

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