

Synthesis of Molybdenum Carbide Supported on Carbon Composite Derived from Lignin for Hydrogen Evolution Reaction

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To solve the environmental pollution and depletion of fossil fuels, development of alternative energy is needed. Hydrogen is a promising energy source because of its high energy density and environmental benignity. Currently, Platinum is the best catalyst in hydrogen evolution reaction (HER). However, its high cost and limited reserve hinder large scale applications. Thus, the development of abundant and low-cost catalysts is required for HER. Lignin is a waste material from paper industry, but it might be used as a potential material for value added product due to abundant aromatic polymer, high carbon content, and extensively crosslinked polymeric network. In this regard, we synthesized molybdenum carbide on carbon composite using lignin as carbon sources for carbide and support formation simultaneously. Our synthesis method is simple and safe because it does not use pretreatment process and toxic gas. Among the prepared catalysts, Lignin 600-800T catalyst showed high HER activity with a low overpotential of 159 mV at 10 mAcm⁻² in acid media.