

Nanostructured Materials for Electrocatalytic Processes

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Replacement of precious metal catalysts by commercially available alternatives is of great importance among both fundamental and practical catalysis research. Nanostructured carbon-based and transition metal materials have demonstrated promising catalytic properties in a wide range of energy generation/storage applications. Specifically engineering carbon with guest metals/metal-free atoms can improve its catalytic activity for electrochemical oxygen evolution reaction (OER) and hydrogen evolution reaction (HER), thus can be considered as potential substitutes for the expensive Pt/C or IrO₂ catalysts in metal-air batteries and water splitting process. In this presentation, I will talk about the synthesis of nonprecious metal and their application on electrocatalysis [1-5]. The excellent OER and HER performance (high catalytic activity and efficiency) and reliable stability indicate that new materials are promising highly efficient electrocatalysts for clean energy conversion. I will also present some research results of electrocatalytic CO₂ reduction and N₂ reduction conducted in my research group [6-8].