

Structural Alteration of MoS₂ by Incorporating Fe, Co Composite for an Enhanced Oxygen Evolution Reaction

Authors : Krishnamoorthy Sathiyam, Shanti Gopal Patra, Ronen Bar-Ziv, Tomer Zidki

Abstract : Developing efficient non-noble metal catalysts that are cheap and durable for oxygen evolution reaction (OER) is a great challenge. Moreover, altering the electronic structure of the catalyst and structural engineering of the materials provide a new direction for enhancing the OER. Herein, we have successfully synthesized Fe and Co incorporated MoS₂ catalysts, which show improved catalytic activity for OER when compared with MoS₂, Fe-MoS₂, and Co-MoS₂. It was found that at an optimal ratio of Fe and Co, the electronic and structural modification of MoS₂ occurs, which leads to change in orientation and thereby enhances the active catalytic sites on the edges, which are more exposed for OER. The nanocomposites have been well characterized by X-ray diffraction (XRD), scanning electron microscope (SEM), and energy dispersive X-ray analysis (EDX), Elemental Mapping, transmission electron microscope (TEM), and high-resolution transmission electron microscope (HR-TEM) analysis. Among all, a particular ratio of FeCo-MoS₂ exhibits a much smaller onset with better catalytic current density. The remarkable catalytic activity is mainly attributed to the synergistic effect from the Fe and Co. Most importantly, our work provides an essential insight in altering the electronic structure of MoS₂ based materials by incorporating promoters such as Co and Fe in an optimal amount, which enhances OER activity.

Keywords : electrocatalysts, molybdenum disulfide, oxygen evolution reaction, transition metals

Conference Title : ICNNEM 2020 : International Conference on Nanotechnologies, Nanomaterials and Electronic Materials

Conference Location : Paris, France

Conference Dates : January 23-24, 2020