

Carbon Dot Templated Metal Double Hydroxide Composite for Hydrogen Evolution Reaction

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Hydrogen being an efficient energy carrier suits efficiently as an alternative fuel source. Electrocatalytic water splitting is an effective way to achieve hydrogen evolution reaction (HER) through a simple proton electron-transfer mechanism. In this study, a carbon dot (CD) based Ni-Co double hydroxide nanocomposite has been designed for HER. The structural features of the composites were analyzed thoroughly through proper microscopic studies. The overpotential was 234 mV for the hydrogen evolution reaction for a current density of 10 mAcm^{-2} with a Tafel slope of 47 mVdec^{-1} . The catalyst showed significant activity over a wide range of pH. The stability was tested over 10hr. The catalytic property was attributed to the intrinsic layered structure, interconnected nanoarray configuration, and unique redox characteristics. CDs provided a higher active area for catalysis and electronic environment. This study highlights the use of a CD support for the synthesis of low-cost metal double hydroxide electrocatalyst.

Keywords

Carbon dot; bimetallic composite; synergism; electrocatalysis; hydrogen evolution reaction.