# Nife dlh hierarchical structure as efficient photoanode towards photoelectrochemical water splitting

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Converting solar energy into hydrogen energy has been regarded as the most sustainable strategy to address the global energy shortage and environmental issues. Among various solar to hydrogen conversion technologies, photo electrochemical (PEC) water splitting was proven to be the most promising alternative, because (I) it requires much lower over potential to drive the water splitting in comparison with electrical water splitting (~2.0 V); (ii) high HER and OER activities can be achieved at the same time by rationally designing the photoelectrodes; (iii) $H_2$ and $O_2$ could be obtained easily from the separated reaction chamber, while the separation of $H_2$ from $H_2$ and $O_2$ mixture is a critical challenge in photocatalytic water splitting; (V) PEC water splitting does not require high temperature and complicated processing steps in comparison with the solar-thermochemical water splitting. Designing an effective heterostructure photocatalyst for photo-electrochemical (PEC) water splitting is highly demanded yet challengeable because of limited sunlight utilization and retarded redox reaction kinetics. This work introduces a feasible one-pot hydrothermal strategy of fabricating MoS2/NiFe LDH p-n heterojunctions on electrically conductive porous nickel foam as an efficient photoanode for PEC water splitting. A great enhancement for PEC water oxidation is achieved because of the improved sunlight absorption and the increased photo-excited charge separation rate. The optimal 10 wt% MoS2/Ni0.9Fe0.1 LDH/ nickel foam photoanode demonstrates 3.8 times enhanced PEC activity than the Ni0.9Fe0.1 LDH/NF counterpart and a low Tafel plot of 54 mV dec-1. The bandgap modulation and the Z-scheme charge transfer dynamics due to the formation of MoS2/Knifes LDH p-n heterostructure, along with the high conductivity of porous nickel foam account for the increased photo-current conversion efficiency and the boosted charge transfer

## Biography

Dr.Xiaohong Yang obtained her PhD degree from School of Material Science and Engineering in the University of New South Wales in the year 2014. She is now an associate professor in School of Metallurgy, Northeastern University in China. During 2018-2020, she worked as a visiting research fellow in ARC centre of Nanoscale Biophotonics in Macquarie University Australia. Her research focuses on the development of innovative strategies to synthesize semiconductor nanoparticles and their nanocomposites, to engineer functional assemblies, and to understand the underlying fundamentals for functionality control in energy, environmental and biomedical applications, particularly in the field of gas sensing and photo catalysis. She has published more than 90 papers and has the H index of 22.

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