Room-Temperature Synthesis of Defect-Rich, Ultrathin Nickel-Iron Hydroxides with High Overall Water Splitting Activity

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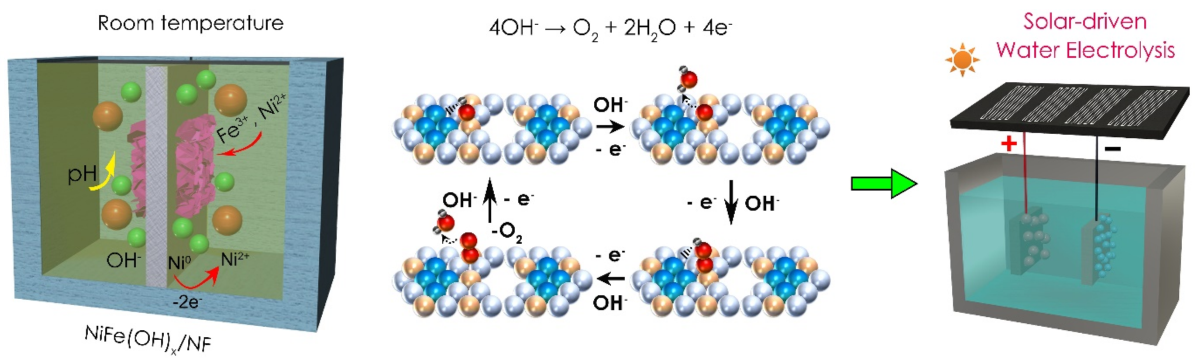
The production of hydrogen *via* alkaline water electrolysis powered by the solar-generated renewable electricity has received great attention over the past decade as it offers an efficient means to locally convert the intermittent solar energy to clean chemical fuels.[1,2] A high-performance alkali electrolyser requires highly active and stable anode and cathode.[3] Low-cost construction of electrocatalysts with high activity and long cycling life plays a crucial role in electrocatalytic water splitting. Here, we report a facile room-temperature one-step strategy for in-situ growth of defect-rich ultrathin nickel-iron hydroxides ($NiFe(OH)_x$) nanosheets on Ni foam (NF), realized by simply immersing NF in an extremely small volume of mixed nickel-iron (Ni-Fe) nitrate aqueous solution. The prepared $NiFe(OH)_x$/NF electrodes exhibit remarkable activity towards both oxygen evolution reaction (OER) and hydrogen evolution reaction (HER), and can afford high current densities up to 1 A cm^{-2}. A two-electrode overall water splitting device is assembled using $NiFe(OH)_x$/NF as both the anode and cathode, which achieves 10 mA cm^{-2} at 1.50 V in 1 M KOH when powered by a commercial silicon solar cell.



References

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