Ostwald Ripening Driven Exfoliation to Ultrathin Layered Double Hydroxides Nanosheets for Enhanced Oxygen Evolution Reaction

이민석, Bin Chen, 용기중†
포항공과대학교
(kyong@postech.ac.kr†)

Layered double hydroxides (LDHs) are regarded as the highly promising electrocatalysts to promote the OER kinetics. However, it remains a great challenge to find an efficient strategy to exfoliate the bulk LDHs into ultrathin and stable nanosheets with increased surface area and exposed active sites. Herein, a novel Ostwald ripening driven exfoliation (ORDE) of NiFe LDHs has been achieved in situ on the electrodes by spontaneously self-etching and redepositing via a simple hydrothermal treatment without the assistance of any exfoliating reagent or surfactant. The thermodynamically driven Ostwald ripening has been expanded to the exfoliation of two-dimensional layered materials for the first time. Compared with conventional exfoliation methods, this ORDE is a time-saving and green strategy that avoids the serious adsorption of surfactant molecules. As a result, the exfoliated ultrathin, clean, and vertically aligned NiFe nanosheets with much higher surface area and numerous exposed active edges and sites demonstrated significantly enhanced OER performances with low overpotential, long-term stability, and flexibility.