Short Communication

Solvent dependent in situ growth of Ni_xS_y supported on nickel foam as electrocatalysts for oxygen evolution reaction

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In situ growth of Ni_xS_y on nickel foam ($\text{Ni}_x\text{S}_y/\text{NF}$) has been investigated by hydrothermal or solvothermal process in water, ethanol and their mixture. XRD shows that the obtained Ni_xS_y is consisted of Ni_3S_2 and NiS in the three solvents. Ni_xS_y synthesized in ethanol has weaker peak intensities and more NiS planes, implying lower crystallinity and different electrocatalytic properties from the other two samples. SEM images confirm regular morphology transform of $\text{Ni}_x\text{S}_y/\text{NF}$ affected by different solvents. Nanorods and polyhedron structure of Ni_xS_y can be observed in water and ethanol, respectively. For mixture solvents, obvious transition morphology including some nanorods and polyhedron structures can be observed. Electrochemical measurements for oxygen evolution reaction (OER) reveal that $\text{Ni}_x\text{S}_y/\text{NF}$ synthesized in ethanol has the earliest onset potential (1.24 V vs. RHE) and the largest current density, which may be derived from different crystal structure and morphology of Ni_xS_y . Therefore, the solvent dependent activity may provide a new way to prepare excellent electrocatalysts for OER.

Keywords: crystal structure; solvent effect; microstructure; in situ growth; $\text{Ni}_x\text{S}_y/\text{NF}$

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