

## Ordered Mesoporous Molybdenum Carbides as Pt-Free Electrocatalysts for Alkaline Hydrogen Evolution Reaction

백두산, 주상훈†  
울산과학기술원  
(shjoo@unist.ac.kr†)

Water electrolysis is the most environmentally benign pathway to generate hydrogen. For water-alkali electrolyzers, the sluggish reaction kinetics of hydrogen evolution reaction (HER) remains an important challenge, which originates from the water dissociation step required for the alkaline HER. In this work, we demonstrate that ordered mesoporous materials composed of metastable face-centered-cubic  $\alpha$ -MoC<sub>1-x</sub> phase (MMC) are capable of catalyzing alkaline HER with Pt-like activity. We prepared MMC materials via nanocasting method using mesoporous silicas such as KIT-6 and SBA-15 as templates. We controlled the types of precursors, carburization temperatures, and post-treatment condition for the synthesis of MMC. The optimized MMC showed the HER activity with an overpotential of 96 mV at  $-10 \text{ mA cm}^{-2}$ , which compared favorably to that of Pt/C (80 mV).