Short Communication

Liquid Crystal Template Assisted Electrodeposition of Molybdenum Sulfide Nanoparticles Supported on Carbon Fiber as Efficient Electrocatalyst for Hydrogen Evolution Reaction

Yong-Ming Chai¹, Xiao Shang¹, Wen-Kun Gao^{1,2}, Bin Dong^{1,2,*}, Chen-Guang Liu¹

¹ State Key Laboratory of Heavy Oil Processing, China University of Petroleum (East China), Qingdao 266580, PR China

² College of Science, China University of Petroleum (East China), Qingdao 266580, PR China

*E-mail: dongbin@upc.edu.cn

doi: 10.20964/2018.06.30

Received: 5 June 2017 / Accepted: 22 July 2017 / Published: 10 May 2018

Liquid crystal template (LCT) assisted electrodeposition has been utilized to prepare the amorphous MoS_x nanoparticles supported on carbon fiber (MoS_x/CF(LCT)) as electrocatalyst for hydrogen evolution reaction (HER). For comparison, MoS_x electrodeposited in water solution (MoS_x/CF(H₂O)) has also been obtained under the same condition. For both LCT and water solution, the as-deposited MoS_x shows similar amorphous structure, whereas LCT-derived MoS_x exhibits unique nanoparticles uniformly distributing on CF, compared with smooth plane structures of water solution-derived MoS_x. The unique LCT-derived MoS_x nanoparticles may be favorable for more exposure of active sites, improving the contact with electrolyte and accelerating charge transfer. Compared with MoS_x/CF(H₂O), MoS_x/CF(LCT) show superior HER activities as well as excellent stability in the electrochemical measurements. SEM images demonstrate the structural stability of MoS_x/CF(LCT) with nearly unchangeable nanoparticle morphology. Therefore, the LCT-assisted electrodeposition may provide a facile routine to obtain transition metal-based sulfides with unique nanostructure as well as excellent HER properties.

Keywords: electrodeposition; liquid crystal template; nanoparticle; molybdenum sulfide; hydrogen evolution reaction

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