Co doped MoS₂ as Bifunctional Electrocatalyst for Hydrogen Evolution and Oxygen Reduction Reactions

Congrong Wang¹, Shun Wang¹, Jianguo Lv^{1,3,*}, Yuxuan Ma¹, Yongqi Wang¹,
Gaoliang Zhou¹, Mingsheng Chen², Min Zhao^{1,3}, Xiaoshuang Chen^{4,*}, Lei Yang⁵

¹ School of Physics and Materials Engineering, Hefei Normal University, Hefei 230601, China

² School of Electronic Information and Electrical Engineering, Hefei Normal University, Hefei 230601, China

³ Key Laboratory for Photoelectric Detection Science and Technology of Education Department of Anhui Province, Hefei Normal University, Hefei 230601, China

⁴ National Laboratory for Infrared Physics, Shanghai Institute of Technical Physics, Chinese Academy of Sciences, Shanghai 200083, China

⁵ Department of Chemistry and Materials Engineering, Hefei University, Hefei 230601, China

*E-mail: lvjg1@163.com (J. Lv), xschen@mail.sitp.ac.cn (X. Chen).

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Pure MoS₂ and MoS₂ compounds were doped with Co using a hydrothermal method. XRD results indicate that two of the five diffraction peak results at 9.2° and 18.2° may be attributed to low crystallinity of MoS₂. The (002) diffraction peaks for the Co-doped MoS₂ shifted to smaller angle, which may be due to the Mo⁴⁺ ions ($r=0.65\text{ \AA}$) having been replaced by larger Co²⁺ ions ($r=0.74\text{ \AA}$). Raman results show that the intensity of the A_{1g} mode was greater than that of the E_{2g} mode for our samples; this indicates that the samples have edge-terminated structures and possess more electrocatalytic active sites. The results of XPS also confirm that the cobalt ions substituted molybdenum atoms into the lattice of MoS₂. Results from the electrocatalytic test confirms that cobalt doping reduces the charge transfer resistance and increases the electrocatalytic active sites, which are conducive to improving its electrocatalytic performance.

Keywords: Co-MoS₂; electrocatalysts; hydrogen evolution reaction; oxygen evolution reaction

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