Accepted Manuscript

Nano-netlike carbon fibers decorated with highly dispersed $CoSe_2$ nanoparticles as efficient hydrogen evolution electrocatalysts

Song Wan, Jiabo Hu, Guo-Dong Li, Lan Yang, Yipu Liu, Ruiqin Gao, Xiaotian Li, Xiaoxin Zou

PII: S0925-8388(17)30241-4

DOI: 10.1016/j.jallcom.2017.01.207

Reference: JALCOM 40574

To appear in: *Journal of Alloys and Compounds*

Received Date: 14 December 2016

Revised Date: 4 January 2017

Accepted Date: 19 January 2017

Please cite this article as: S. Wan, J. Hu, G.-D. Li, L. Yang, Y. Liu, R. Gao, X. Li, X. Zou, Nano-netlike carbon fibers decorated with highly dispersed $CoSe_2$ nanoparticles as efficient hydrogen evolution electrocatalysts, *Journal of Alloys and Compounds* (2017), doi: 10.1016/j.jallcom.2017.01.207.

Nano-netlike carbon fibers decorated with highly dispersed $CoSe_2$ nanoparticles as efficient hydrogen evolution electrocatalysts

Song Wan,[ab] Jiabo Hu,[b] Guo-Dong Li,[b] Lan Yang,[ab] Yipu liu,[b] Ruiqin Gao,[b] Xiaotian Li*,[a] Xiaoxin Zou*,[b]

a College of Material Science and Engineering, Key Laboratory of Automobile Materials of Ministry of Education, Jilin University, Changchun 130012, P. R. China

b State Key Laboratory of Inorganic Synthesis and Preparative Chemistry, International Joint Research Laboratory of Nano-Micro Architecture Chemistry, College of Chemistry, Jilin University, Changchun 130012, P. R. China

ABSTRACT:

More active sites and high conductivity are two effective ways to improve the activity of non-noble metal electrocatalysts. Herein, we present a facile electrostatic spinning technique to synthesis highly dispersed $CoSe_2$ nanoparticles on three-dimensional nano-netlike carbon fibers through simple thermal treatment of polyacrylonitrile fibers containing Co ions (Co^{2+}-PANF) and subsequent in-situ selenization. Moreover, we show that the resulting material (denoted as $CoSe_2$-CFN) can serve as highly active, efficient and stable non-precious metal electrocatalyst for HER in acidic media. This material achieves a current density of 10 mA/cm^2 at an overpotential of 133 mV with a loading amount of the active material $CoSe_2$ about 0.128 mg/cm^2, which is lower than that of the reported $CoSe_2$-based materials. Meanwhile, $CoSe_2$-CFN exhibits excellent catalytic stability for at least 20 hours and gives nearly 100% Faradaic yield. The excellent hydrogen evolution reaction performance is due to the