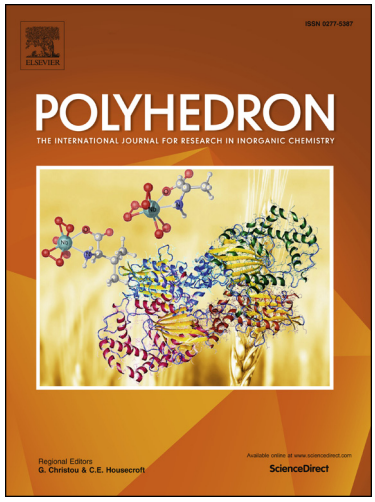

3D Flower-like Ni-Co-S with High Specific Surface Area for the Electrocatalytic Oxidation of Methanol

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3D Flower-like Ni-Co-S with High Specific Surface Area for the Electrocatalytic Oxidation of Methanol

Dejuan Fa, Mao Zhou, Hui Zhao, Yiwei Jiang, Yuqing Miao*

University of Shanghai for Science and Technology, Shanghai 200093, P. R. China

Abstract: The 3D flower-like Ni-Co-S was synthesized by a typical hydrothermal method in the presence of urea and thioacetamide. As comparison, the urchin-like Ni-Co-O was prepared in the absence of thioacetamide. The former processed higher electrocatalytic activity for methanol oxidation than the latter. Ni-Co-S exhibited the anodic peak current density of 19.23 mA/cm^2 for methanol oxidation, far higher than Ni-Co-O. It also showed the Tafel slopes of 57 mV/dec, much lower than Ni-Co-O. The BET results showed that the surface area and pore volume are 96.373 m^2/g and 0.367 cm^3/g for the flower-like Ni-Co-S, which is higher than 88.736 m^2/g and 0.224 cm^3/g for the urchin-like Ni-Co-O. As a result, the flower-like Ni-Co-S possessed more electroactive sites for methanol oxidation. The superhydrophobicity of the flower-like Ni-Co-S helps for the formation of micro air film on the surface of flower petals. Such a tri-phase interface of Ni-Co-S solid, reaction solution and air film may help for the electrocatalytic oxidation of Ni-Co-S toward methanol oxidation since the produced CO_2 can leave the surface of Ni-Co-S quickly and enter into solution phase due to the presence of air film and high solubility of CO_2 in aqueous solution.

Keywords: Ni-Co-S, Ni-Co-O, Flower-like, Methanol Oxidation

* Corresponding author. Email address: yqmiao@usst.edu.cn (Y. Miao). Tel: 86-13916670969
Dejuan Fa, Mao Zhou, Hui Zhao and Yiwei Jiang contributed equally to this work and should be considered as co-first authors.