Preparation of Sulphur-Doped Graphene-Based Electrodes by Cyclic Voltammetry: A Potential Application for Vanadium Redox Flow Battery

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A new, simple and green method was proposed for preparation of the S-doped graphene based pencil graphite electrodes (S-GPGEs) in sulfuric acid solution by cyclic voltammetric method in this work. The obtained S-GPGEs were investigated by the measurements of scanning electron microscopy (SEM), X-ray photoelectron spectroscopy (XPS), and electrochemical performance. The results show that the S-GPGEs were composed of many nano flakes. –C-S-C- and –C-SO_x-C- (x:2, 3) groups were determined by XPS. Raman spectra were taken to determine the optical properties of the electrodes. Thus, the results show that S-doped graphene was obtained in situ. S-GPGEs were used as positive electrode components of a vanadium redox flow battery (VRB). The electrodes showed great electrochemical activity in the positive electrolyte of VRB. This novel method is easy, cheap and environmentally friend for production of S-doped graphene for many application such as sensor, electro-optics, energy storage devices and etc.

Keywords: Graphene, Vanadium Redox Flow Battery, Cyclic Voltammetry, S-Doped Graphene, Graphene electrode

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