Two Dimensional Oxygen-deficient Bismuth oxy-iodide Nanosheets with Enhanced Supercapacitor Performances

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Introducing oxygen vacancy into oxides has become an effective strategy for enhancing the electrochemical performance. Herein, a series of identical two-dimensional BiOI nanosheets with various concentration of oxygen vacancies are rationally fabricated through a facile ion-exchange and annealing process under Ar atmosphere. The presence of oxygen vacancies has been identified by X-ray photoelectron spectroscopy (XPS) and high-resolution transmission electron microscopy (HRTEM). The X-ray diffraction (XRD) and field emission scanning electron microscopy (FESEM) are used to probe the evolution of crystal structure and morphology of the product. Electrochemical data show that reduced two-dimensional BiOI nanosheets electrodes with appropriate oxygen vacancies exhibit a significant improvement on capacitance compared to the pristine electrodes. The specific capacitance of the as-prepared BiOI-600 electrode reaches 620 F g⁻¹ (at 0.5 A g⁻¹), and 65 % capacitance retention after 1000 cycles at 2 A g⁻¹. The good electrochemical performances can be mainly ascribed to the convenient diffusion of electrolyte ions (*e.g.* two dimensional nanosheets) and more surface active sites (*e.g.* oxygen vacancies) for redox reactions. These findings provide new chance for the oxygen-vacancies-rich two-dimensional BiOI nanosheets as high-performance supercapacitor electrodes.

Keywords: BiOI nanosheet, oxygen vacancy, supercapacitor, electrochemical energy storage

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