



材料合成及性能

电化学法制备的还原氧化石墨烯薄膜及其光电性能研究

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摘要：通过电化学方法在FTO导电玻璃上沉积了不同还原程度（C/O）的还原氧化石墨烯薄膜（rGO），其中rGO薄膜由未经处理的GO电解液制备，A-rGO由碱处理后的电解液制备，B-rGO由NaBH₄处理后的电解液制备。利用XRD、XPS、SEM、UV-Vis对薄膜的化学结构和微观形貌进行了表征，并研究了薄膜在可见光照射下的光电性能。结果表明：在1.8 V下沉积的不同C/O比的rGO薄膜中，B-rGO薄膜的C/O比最高（8.1），带隙最小（0.54 eV），导带最靠近FTO的导带位置。在可见光照射下，几种薄膜均产生了阴极电流，电流密度随C/O比的增大而增大，其中B-rGO最大达1 μA·cm⁻²。本文提供了一种通过控制C/O比来控制rGO薄膜光电性能的方法。

关键词：还原石墨烯薄膜 光电性能 还原程度 能带结构

Photoelectric Conversion Properties of Graphene Oxide Film Prepared by Electrochemical Deposition

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Abstract: Reduced graphene oxide (rGO) films with different reduction degrees (C/O ratios) were prepared on FTO by electrochemical deposition method. rGO prepared from GO electrolyte, A-rGO prepared from electrolyte after alkali treatment, and B-rGO prepared from electrolyte after NaBH₄ treatment, respectively. XRD, XPS, SEM and UV-Vis analysis were adopted to analyze the chemical structure and morphology of the films. The photoelectric properties of the films under visible light were studied. The results show that B-rGO film has the highest C/O ratio (8.1) and the lowest band gap (0.54 eV) among the three films, and its conduction band is almost closed to the FTO's. Under visible light illuminating, the films all generate cathodic photocurrent, and the photocurrent density increases with the increasing of C/O ratio. The photocurrent density of B-rGO (1 μA·cm⁻²) is the largest in the three films. In our work, we provide a feasible method to control the photoelectric property of rGO films by controlling their C/O ratios.

Keywords: reduced graphene oxide photoelectric property reduction degree energy band structure

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