J Nanomater Mol Nanotechnol 2018, Volulme: 7
DOI: 10.4172/2324-8777-C10-048

S-TiO_2/S-reduced graphene oxide for enhanced photoelectrochemical water splitting

Mohamed H Elbakkay
Beni-Suef University, Egypt

Sulfur-doped titanium oxide on the surface of sulfur-doped reduced graphene oxide nanocomposites (S-TiO_2/S-RGO) was successfully synthesized for the first time through a simple low-cost solvothermal reaction process. The sulfur doping was detected in both the TiO_2 matrix and carbon framework structure of reduced graphene oxide using X-ray photoelectron spectroscopy (XPS) and Energy-dispersive X-ray spectroscopy (EDX). Cross-sectional AFM analysis of S-RGO nanosheets reveals a thickness of 0.51 nm which is much thinner than those previously reported of heteroatom doped-RGO, confirming the single-layer feature. When the as-prepared (S-TiO_2/S-RGO) nanocomposites are utilized as photoanodes for photoelectrochemical (PEC) water splitting, they exhibited an enhanced photoelectrochemical performance and long-term stability. The photocurrent density of S-TiO_2/S-RGO(0.2) photoanode revealed 3.36mA/cm^2 at 1V vs Ag/AgCl which is considered 3 times enhancement compared to bare synthesized TiO_2. This enhancement in the photocurrent density was attributed to the increased separation rate of photogenerated electrons and holes and efficient visible light harvesting as a result of the successful combination of the S-TiO_2 and the S-RGO in the same nanocomposite photoanode. This promising result presents a new approach for the synthesis of high-efficient future metal-free photoelectrocatalysts.

malbakkay@yahoo.com

Notes: