

Effect of hydrothermal growth time on ZnO nanorod arrays photoelectrode performance

ABSTRACT

High density and vertically aligned zinc oxide nanorod arrays (ZnO NRs) have been prepared directly on indium-doped tin oxide (ITO) substrates via two-steps preparation: sol-gel spin coating and hydrothermal process. The nanostructured ZnO was characterized for its morphology, crystalline structure and optical properties by using field emission scanning electron microscopy (FESEM), X-ray diffractometry, and ultraviolet-visible spectroscopy respectively. In addition, the photoelectrochemical (PEC) properties were investigated through photocurrent measurements. The ZnO NRs/ITO had wurtzite-structured (hexagonal) ZnO and preferred growth along (0001) direction. When the growth time was 4 h, ZnO NRs/ITO showed impressive photoresponse. The PEC analysis verified that the ZnO NRs gave better photocurrent response and photoconversion efficiency with approximately 42 times greater than seed layer.

Keyword: Hydrothermal deposition; ZnO nanorod arrays; Photoresponse; Photoelectrode; Photoconversion efficiency