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Coupling heterostructure of thickness-controlled nickel oxide nanosheets layer and titanium dioxide nanorod arrays via immersion route for self-powered solid-state ultraviolet photosensor applications (Article) (Open Access)

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Abstract

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A coupling heterostructure consisting of nickel oxide nanosheets (NNS) and titanium dioxide nanorod arrays (TNAs) was fabricated for self-powered solid-state ultraviolet (UV) photosensor applications. By controlling the thickness of the NNS layer by via varying the growth time from 1 to 5 h at a deposition temperature of 90 °C, the coupling NNS/TNAs heterojunction films were formed and their structural, optical, electrical and UV photoresponse properties were investigated. The photocurrent measured from the fabricated self-powered UV photosensor was improved by increasing the thickness of NNS from 140 to 170 nm under UV irradiation (365 nm, 750 μWcm^{-2}) at 0 V bias. A maximum photocurrent density of 0.510 μA•cm^{-2} was achieved for a sample with a NNS thickness of 170 nm and prepared with a 3 h NNS growth time. Our results showed that the fabricated NNS/TNAs heterojunction has potential applications for self-powered UV photosensors. © 2019 Elsevier Ltd

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Engineering uncontrolled terms: Deposition temperatures | Electronic materials | Immersion route | Nano-rod arrays | Nio nanosheets | Oxide nanosheets | Photocurrent density | Photosensor

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