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Enhancing the performance of self-powered ultraviolet photosensor using rapid aqueous chemical-grown aluminum-doped titanium oxide nanorod arrays as electron transport layer (Article)

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Abstract

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Aluminum (Al)-doped titanium dioxide nanorod arrays (ATNs) were grown on fluorine-doped tin oxide-coated glass at different Al atomic concentrations ranging from 1 at.% to 5 at.% in a Schott bottle through single-step aqueous chemical growth for self-powered photoelectrochemical cell-type ultraviolet (UV) photosensor applications. X-ray diffraction patterns showed that the grown ATNs exhibited a crystalline rutile structure. The ATNs showed smaller crystallite size and average nanorod diameter and length compared with the undoped sample. The photocurrent measured from the fabricated UV photosensors improved to some extent with increasing Al-dopant concentration. Samples with 2 at.% Al showed the maximum photocurrent of 108.87 $\mu A/cm^2$ at 0 V bias under UV irradiation (365 nm, 750 $\mu W/cm^2$). The results show that high-performance UV photosensors can be fabricated and enhanced using ATNs easily prepared in a glass container. © 2018 Elsevier B.V.

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Aluminum-doped titanium dioxide | Nanorods | Photoelectrochemical cell | Structural properties | Ultraviolet photosensor

Indexed keywords

Engineering controlled terms: Aluminum alloys | Aluminum oxide | Bottles | Crystallite size | Doping (additives) | Electrochemical cells | Electrochemistry | Electron transport properties | Glass | Irradiation | Nanocomposites | Nanorods | Optical sensors | Oxide minerals | Photoelectrochemical cells | Photosensitivity | Structural properties | Tin dioxide | Tin oxides | Titanium dioxide | Titanium oxides | X ray diffraction

Compendex keywords: Aqueous chemical growth | Atomic concentration | Electron transport layers | Fluorine doped tin oxide | Glass containers | Oxide nanorod arrays | Photosensor | Rutile structure

Related documents

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Low temperature growth of rutile titanium dioxide nanorod arrays using a novel facile method for UV photosensor application

Yusoff, M.M. , Mamat, M.H. , Malek, M.F.
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Doping effects on internally coupled seebeck coefficient, Engineering main heading: Aluminum coatings

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