215
Accession number:20120314700597
Title:Multiple-trapping governed electron transport and charge separation in ZnO/In<inf>2</inf>S<inf>3</inf> core/shell nanorod heterojunctions
Authors:Strothkämper, Christian (1); Schwarzburg, Klaus (1); Schütz, Robert (1); Eichberger, Rainer (1); Bartelt, Andreas (1)
Author affiliation:(1) Helmholtz Center Berlin for Materials and Energy, Hahn-Meitner-Platz 1, D-14109 Berlin, Germany
Corresponding author:Strothkämper, C.(christian.strothkaemper@helmholtz-berlin.de)
Source title:Journal of Physical Chemistry C
Abbreviated source title:J. Phys. Chem. C
Volume:116
Issue:1
Issue date:January 12, 2012
Publication year:2012
Pages:1165-1173
Language:English
ISSN:19327447
E-ISSN:19327455
Document type:Journal article (JA)
Publisher:American Chemical Society, 2540 Olentangy River Road, P.O. Box 3337, Columbus, OH 43210-3337, United States
Abstract:Solar cells based on ZnO nanorods with thin In<inf>2</inf>S<inf>3</inf> shells have recently shown promising solar conversion efficiencies. Using optical-pump terahertz-probe (OPTP) spectroscopy, the charge separation across ZnO/In<inf>2</inf>S<inf>3</inf> interfaces is analyzed for ZnO nanorods with systematically varied In<inf>2</inf>S<inf>3</inf> absorber thicknesses, measuring transient photoconductivities with subpicosecond time resolution. Whereas for neat In<inf>2</inf>S<inf>3</inf> films the photoconductivity is dominated by fast multiple trapping and second order recombination, the ZnO/In<inf>2</inf>S<inf>3</inf> heterostructures exhibit slow electron injection dynamics occurring within hundreds of picoseconds, and long-lived charge-separated states. The transient photoconductivity of the ZnO/In <inf>2</inf>S<inf>3</inf> core/shell system is analyzed with a correlated three component effective medium approach, yielding a significant decrease of the charge separation efficiency with increasing shell thickness. © 2011 American Chemical Society.
Number of references:42
Main heading:Photoconductivity
Controlled terms:Conversion efficiency - Heterojunctions - Nanorods - Optical pumping - Separation - Terahertz spectroscopy - Zinc oxide
Uncontrolled terms:Charge separations - Charge-separated state - Core/shell - Effective medium - Electron transport - Multiple trapping - Picoseconds - Second orders - Shell thickness - Solar conversion efficiencies - Subpicosecond - Three component - Time resolution - Transient photoconductivity - ZnO - ZnO nanorod
Classification code:931.1 Mechanics - 804.2 Inorganic Compounds - 802.3 Chemical Operations - 933 Solid State Physics - 761 Nanotechnology - 714.2 Semiconductor Devices and Integrated

Circuits - 525.5 Energy Conversion Issues - 741.1 Light/Optics
DOI:10.1021/jp2071748
Database:Compendex