Carrier-selective p- and n-contacts for efficient and stable photocatalytic water reduction

The successful realization of carrier-selective contacts for crystalline silicon (c-Si) based device for photocatalytic hydrogen production has been demonstrated. The proposed TiO$_2$ protected carrier-selective contacts resemble a metal-oxide-semiconductor configuration, including a highly-doped nanocrystalline silicon (nc-Si) and a tunnel oxide, thereby form a heterostructure with the c-Si substrate. By substituting conventional pn$^+$-junction Si by c-Si/SiO$_2$/nc-Si structure for both front and back contacts we demonstrate a 16% increase in photovoltage (an open circuit voltage of 584 mV under AM 1.5G conditions). TiO$_2$ protected carrier-selective photoelectrodes showed excellent long-term durability in acidic aqueous solution having stable photocurrent output for more than 40 days, implying that the proposed carrier-selective contact is a promising configuration to substitute for the conventional pn-junction based c-Si photocathodes.

General information
Publication status: Published
Organisations: Department of Physics, Experimental Surface and Nanomaterials Physics, Department of Micro- and Nanotechnology, Silicon Microtechnology, Center for Electron Nanoscopy
Pages: 59-64
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: Catalysis Today
Volume: 290
ISSN (Print): 0920-5861
Ratings:
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 4.55 SJR 1.347 SNIP 1.329
Web of Science (2017): Impact factor 4.667
Web of Science (2017): Indexed yes
Original language: English
Keywords: Photocatalysis, Carrier-selective contact, hydrogen evolution, metal-oxide-semiconductor
Electronic versions:
CATTOD_D_16_00374R1_accepted.pdf. Embargo ended: 21/05/2019
DOIs:
10.1016/j.cattod.2016.11.028
Source: PublicationPreSubmission
Source ID: 127420034
Research output: Contribution to journal › Journal article – Annual report year: 2016 › Research › peer-review