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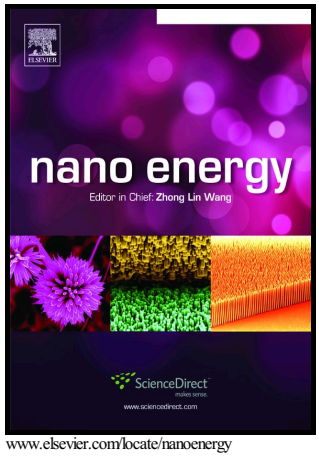

www.elsevier.com/locate/nanoenergy

PII: S2211-2855(17)30004-6
DOI: http://dx.doi.org/10.1016/j.nanoen.2017.01.005
Reference: NANOEN1719

To appear in: *Nano Energy*

Received date: 23 December 2016
Revised date: 3 January 2017
Accepted date: 3 January 2017

Cite this article as: Dong Qi Zheng, Ziming Zhao, Rui Huang, Jiaheng Nie, Liji Li and Yan Zhang, High-performance Piezo-phototronic Solar Cell Based o Two-dimensional Materials, *Nano Energy* http://dx.doi.org/10.1016/j.nanoen.2017.01.005

High-performance Piezo-phototronic Solar Cell Based on Two-dimensional Materials

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Abstract

Pieoztronic and piezo-phototronic are two emerging fields of flexible electronics and nanoelectronics using by piezoelectric semiconductor materials, such as ZnO, GaN, InN and CdS. Recent experiments shown piezoelectric and semiconductor properties of monolayer $MoS_{2,}$ which have been applied as nanogenertor and piezotronic transistor. Two-dimensional piezoelectric semiconductor can be utilized for high-performance photovoltaic devices. In this paper, a two-dimensional material piezo-phototronic solar cell is studied theoretically based on a monolayer MoS_2 metal-semiconductor contact. The current-voltage characteristics, open circuit voltage, maximum output power, fill factor and power conversion efficiency have been studied for the piezo-phototronic solar cell. The modulation level of piezo-phototronic effect is presented to evaluate the performance under applied strain. The piezo-phototronic effect can increase the open circuit voltage 5.8% at strain of 1%. This principle can be a new way to develop high-performance two-dimensional solar cells.