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Research paper

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Zdeňka Hájková, Martin Ledinský, Aliaksei Vetushka, Jiř í Stuchlík, Martin Müller, Antonín Fejfar, Milan Bouša, Martin Kalbá č, Otakar Frank

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Photovoltaic characterization of graphene/silicon Schottky junctions from local and macroscopic perspectives

Zdeňka Hájková[a,*], Martin Ledinský[a], Aliaksei Vetushka[a], Jiří Stuchlík[a], Martin Müller[a], Antonín Fejfar[a], Milan Bouša[b], Martin Kalbáč[b], Otakar Frank[b]

[a] Laboratory of Nanostructures and Nanomaterials, Institute of Physics, Academy of Sciences of the Czech Republic, Cukrovarnická 10/112, 162 00 Prague, Czech Republic
[b] J. Heyrovský Institute of Physical Chemistry, Academy of Sciences of the Czech Republic, Dolejškova 2155/3, 182 23 Prague, Czech Republic

HIGHLIGHTS

- A cost-effective type of graphene/silicon Schottky junctions was prepared.
- I-V curves showed a similar trend macroscopically with solar simulator and locally by C-AFM.
- The suitability of local photovoltaic characterization by C-AFM was proved.
- The thickness of SiO_2 barrier at graphene-silicon interface is one of the key parameters that determines the solar cell performance.

ABSTRACT

We present Schottky junction solar cell composed of graphene transferred onto hydrogenated amorphous and microcrystalline silicon, a low-cost alternative to well-explored crystalline silicon. We demonstrated sample with open-circuit voltage of 445 mV, a remarkable value for undoped graphene-based solar cell. Photovoltaic characteristics of this sample remained stable over 11 months and could be further improved by doping. The graphene/silicon junctions were characterized by current-voltage curves obtained locally by conductive atomic force microscopy (C-AFM) and macroscopically by standard solar simulator. Very good correlation between both

* Corresponding author. Tel.: +420 220 318 528. E-mail: hajkovaz@fzu.cz (Zdeňka Hájková)

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