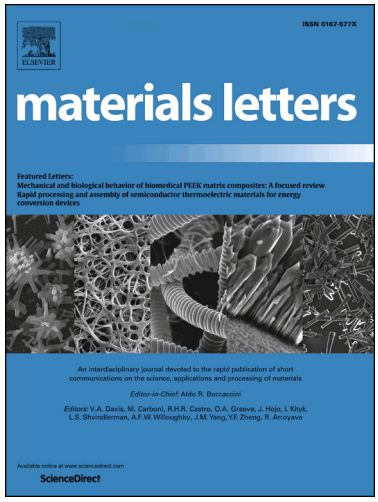

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PII: S0167-577X(17)30009-5
DOI: http://dx.doi.org/10.1016/j.matlet.2017.01.008
Reference: MLBLUE 21961

To appear in: *Materials Letters*

Received Date: 16 April 2016
Revised Date: 13 September 2016
Accepted Date: 3 January 2017

Please cite this article as: R. Bhatia, S. Kumar Ujjain, Soluble Single-Walled Carbon Nanotubes for Photovoltaics, *Materials Letters* (2017), doi: http://dx.doi.org/10.1016/j.matlet.2017.01.008

Soluble Single-Walled Carbon Nanotubes for Photovoltaics

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ABSTRACT

Single wall carbon nanotubes (SWCNTs) have attracted great attentions in the fields of nanoscience and nanotechnology due to their unprecedented physical/chemical/mechanical stability and high dimensional aspect ratio resulting superior electrical properties. However, their poor solubility in both organic and aqueous solvents refrain their solution processability and hence practical applications. In the present work, we report one-pot functionalization of SWNCT based on the nitrene chemistry of two structurally different aromatic azides having ester functional groups (very low concentrations 10% w/w), by thermal activation which renders them soluble in organic solvents and water. The resulting functionalized SWCNTs (*f*-SWCNT I & *f*-SWCNT II) covalent linkage and the strong electronic interaction between the P3HT and *f*-SWCNTs are confirmed by various spectroscopic measurements and electrochemical analysis. The bulk heterojunction (BHJ) photovoltaic cell based on the solution cast P3HT:PCBM with doping concentrations of *f*-SWCNTs, demonstrate up to 30% increase in the power conversion efficiency with respect to the reference cell under AM 1.5 illumination (100 mW/cm^2).

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