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**Indoloindole-based small molecule bulk heterojunction small molecule solar cells**

Min Jae Sung,<sup>‡<sup>a</sup></sup> Na Gyeong An,<sup>‡<sup>b</sup></sup> Canjie Wang,<sup>c</sup> Yun-Hi Kim<sup>\*<sup>c</sup></sup>, Jin Young Kim,<sup>\*<sup>b</sup></sup> and Soon-Ki Kwon<sup>\*<sup>a</sup></sup>

<sup>a</sup> Department of Materials Engineering and Convergence Technology and ERI, Gyeongsang National University, Jinju 660-701, Republic of Korea

<sup>b</sup> Department of Energy Engineering, School of Energy and Chemical Engineering, Ulsan National Institute of Science and Technology (UNIST), Ulsan 689-798, South Korea.

<sup>c</sup> Department of Chemistry and RINS, Gyeongsang National University, Jinju 660-701, Republic of Korea

<sup>‡</sup> These authors contributed equally.

\*E-mail: [ykim@gnu.ac.kr](mailto:ykim@gnu.ac.kr); [jykim@unist.ac.kr](mailto:jykim@unist.ac.kr); [skwon@gnu.ac.kr](mailto:skwon@gnu.ac.kr)

**Abstract:**

An acceptor-donor-acceptor (A-D-A) conjugated small molecule, DHII-EH-TR, was designed, synthesized, and its solar cell performance studied. The DHII-EH-TR molecule with its extended fused aromatic core had a narrow bandgap and displayed red-shifted absorption. To investigate its photovoltaic properties and device application, small molecule-based organic photovoltaics (SMOPVs) were fabricated having the conventional structure of ITO/PEDOT:PSS/DHII-EH-TR:PC<sub>70</sub>BM/ZnO NPs/Al (PEDOT:PSS, poly(3,4-ethylenedioxythiophene):polystyrene sulfonic acid; ZnO NPs, ZnO nanoparticles). Solar cells made with a blend of 1,8-diiodooctane with ZnO NPs generated the highest performance with a power conversion efficiency (PCE) of 3.60%. Charge dynamics and transport, microscopic thin film analysis, and morphology were studied to explain the performance of SMOPVs made with DHII-EH-TR.

Keywords:

Indoloindole core; small molecule-based OPV; chemical structure design; 3-ethylrhodanines; morphology; charge dynamics and transport

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