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**“Characterisation and optimisation of materials in bulk heterojunction polymer solar cells and perovskite photovoltaic devices”**

Ossila Ltd.

Research Associate     Darren C. Watters

Donor-acceptor conjugated copolymers have been successfully utilised as efficient light harvesting materials in organic photovoltaic (OPV) devices. Here I report on the use of a composite cathode structure to optimise the power conversion efficiencies of PCDTBT-based OPVs with confirmation from a reflectivity model describing the electromagnetic field within the device. Engineering the structure of conjugated polymers via inclusion of sidegroups and/or substituting moieties along the polymer backbone can lead to fine tuning characteristics of the material, including solubility and absorption spectra. The characterisation of the optoelectronic properties of such polymer:fullerene blends as well as the optimisation of such materials into OPV devices is described.

Organometal halide perovskite photovoltaics are a promising new technology receiving much interest, with efficiencies greater than 15% reported. However, much progress is still required to standardise material formation and device fabrication, with devices often requiring multi step techniques and performance affected by hysteresis.

**主催: 九州大学 最先端有機光エレクトロニクス研究センター  
: 財団法人九州先端科学技術研究所 (ISIT)  
共催: 九州大学 未来化学創造センター**