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Synthesis and Characterization of C60-Porphyrin Derivatives for Enhanced Photovoltaic Performance through Efficient Charge Generation and Transport. CHIEN-LUNG WANG, RYAN M. VAN HORN, WENBIN ZHANG, DAVID A. MODARELLI, STEPHEN Z. D. CHENG, The University of Akron — Although organic photovoltaics has been developed for over 30 years, low device efficiency still hinders it from wide use. To efficiently convert solar radiation into electricity, a material must convert solar radiation to charges and charge transport channels are required. C60-porphyrin dyads are highly efficient charge generation media. However, making transport channels by packing such dyads into an ordered structure remains challenging. In this study, a C60-porphyrin dyad (MonoC60-Por) capable of forming hexagonal columnar phase has been synthesized. DSC thermal diagrams show one main phase transition process in MonoC60-Por. Wide-angle X-ray diffraction and electron diffraction results reveal that the phase transition is between isotropic melt and a hexagonal columnar phase. Significant quenching of fluorescence of the porphyrin core in the dyad is observed by steady-state fluorescence measurement, which is indicative of potential high charge generation. The ordered structure formed by MonoC60-Por therefore holds the potential to enhance organic photovoltaic efficiency through efficient charge generation and transport.

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