

Morphology Studies of High-Performance Ternary Organic Bulk Heterojunction Solar Cells

Jiangquan Mai, Tsz Ki Lau and Xinhui Lu

Department of Physics, The Chinese University of Hong Kong, Hong Kong, P. R. China.

E-mail: xhlu@phy.cuhk.edu.hk

Ternary organic solar cells are emerging as a promising strategy to enhance organic photovoltaic device efficiency by broadening light absorption range. However, how to find compatible donor materials which allow comparable loadings of each component remains a challenge. In this article, we focus on studying the donor polymer compatibilities in ternary systems. Four typical donor polymers with quite different chemical structures and absorption ranges were combined mutually to form six distinct ternary systems with fullerene derivative acceptor. Grazing-incidence wide-angle and small-angle X-ray scattering were employed to explore the structural information from angstrom to nanoscale. We find that morphology compatibility in terms of molecular packing and phase separation is the key to donor material selection which greatly extends the donor candidate pool for ternary organic solar cell research.

References

- [1] Ameri, T.; Khoram, P.; Min, J.; Brabec, C. J. "Organic Ternary Solar Cells: A Review.", *Adv. Mater. Weinheim* (2013), 25, 4245–66.