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GIXRD studies of solvent annealing effect in donor-acceptor structures

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Bulk heterojunctions (BHJs), in which electron-donor and electron-acceptor material are blended together from a common solution, represent the most promising device structure for high-efficiency organic solar cells. It has been shown that BHJs solar cells can reach higher efficiencies and fill factors by controlling the morphology applying solvent vapor annealing treatments (SVA) [1]. In this technique, the solvent vapor penetrates into the blend re-organizing the donor-acceptor arrangement. A powerful tool to study these changes in the morphology is grazing incidence wide angle X-ray scattering (GIWAXS) with a synchrotron source. In this work, 2D-GIWAXS is employed to investigate the effect of the solvent annealing on the structure of BHJs formed by two oligothiophenes (donor) with [6,6]-phenyl C71-butyric acid methyl ester (PC71BM) (acceptor) [1]. In addition, the incident angle was varied in order to obtain depth-resolved information of the structure. The structural results are correlated with the photovoltaic performance of the solar cells.

References

- [1] Cordula D. Wessendorf et al. "Efficiency Improvement of Solution-Processed Dithienopyrrole-Based A-D-A Oligothiophene Bulk- Heterojunction Solar Cells by Solvent Vapor Annealing" *Adv. Energy Mater.* 2014, 1400266

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