

Abstract Submitted  
for the MAR13 Meeting of  
The American Physical Society

**Controlling donor/acceptor interface structure by processing solvents in organic solar cells** WEI MA, NC State University, LONG YE, Institute of Chemistry, Chinese Academy of Sciences (ICCAS), GANN ELIOT, NC State University, JIANHUI HOU, Institute of Chemistry, Chinese Academy of Sciences (ICCAS), HARALD ADE, NC State University — The nature of the interface structure between donor and acceptor are known to be critical for fullerene-based solar cells, yet have not been widely studied due to limitations of common characterization techniques. We show that processing solvents are an effective way to control the interface structure (sharp, fractal, or diffuse) of the active layer and thus impact device performance. Six different solvents or solvent mixtures are used as processing solvents in PDPP3T with PC<sub>71</sub>BM blends to investigate the impact of solvents on interface properties. Interface roughness is revealed by analysing the scaling of high-q data of resonant soft x-ray scattering profiles. We find that with the presence of DIO, rough interfaces are always observed. While rough interfaces provide shorter average distances for excitons to reach donor/acceptor interfaces, they also enhance recombination and are thus not ideal. When CF is used as one component, a sharp or slightly diffuse interface is induced. However, over-pure domains (especially mixed CF with DIO) are also created that seem to negatively impact performance. Overall, the mixture of ternary yields the highest PCE of 6.7%.

Wei Ma  
NC State University

Date submitted: 28 Nov 2012

Electronic form version 1.4