Fullerene alloy formation and the benefits for efficient printing of ternary blend organic solar cells - DTU Orbit (31/12/2018)

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Composition average dependent properties for blends of the conjugated polymer P3HT and the fullerenes [60]PCBM, [60]ICBA and their mixtures were studied using cross-polarization magic-angle-spinning solid-state NMR techniques. We found that the blended fullerenes form an alloy and that when mixed with a third polymer component, the system exhibits pseudo-binary phase behaviour instead of the expected ternary phase behaviour. Our results experimentally confirm the earlier hypothesis that the unexpected composition average dependent IV-behaviour for these supposed ternary mixtures are indeed due to them behaving as pseudo-binary mixtures due to alloying of the fullerene components. This finding has vast implications for the understanding of polymer–fullerene mixtures and quite certainly also their application in organic solar cells where performance hinges critically on the blend behaviour which is also investigated in this study.

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