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Enhancing efficiency in polymer-blend solar cells: Structural insights through scattering

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All-polymer solar cells that employ blends of semiconducting polymers are capable of harnessing a greater portion of the incident solar spectrum than singly sensitized devices. However, they invariably show poor performance when compared with small-molecule bulk heterojunction cells. Following our successful approach in adding very small quantities of pristine graphene to the active layer to boost performance in P3HT/PCBM cells, we have recently reported a three-fold enhancement in efficiency of all-polymer (a blend of P3HT and F8BT) photovoltaic devices. These new cells exhibit more balanced transport of electrons and holes, strong dependence of recombination behavior on graphene content, and up to two orders of magnitude increase in mobility, resulting in a peak improvement of over 200