

Enhancing Power Conversion Efficiency of P3HT/PCBM Polymer Solar Cells

Authors : Nidal H. Abu-Zahra, Mahmoud Algazzar

Abstract : In this research, n-dodecylthiol was added to P3HT/PC70BM polymer solar cells to improve the crystallinity of P3HT and enhance the phase separation of P3HT/PC70BM. The improved crystallinity of P3HT/PC70BM doped with 0-5% by volume of n-dodecylthiol resulted in improving the power conversion efficiency of polymer solar cells by 33%. In addition, thermal annealing of the P3HT/PC70MB/n-dodecylthiol compound showed further improvement in crystallinity with n-dodecylthiol concentration up to 2%. The highest power conversion efficiency of 3.21% was achieved with polymer crystallites size L of 11.2nm, after annealing at 150°C for 30 minutes under a vacuum atmosphere. The smaller crystallite size suggests a shorter path of the charge carriers between P3HT backbones, which could be beneficial to getting a higher short circuit current in the devices made with the additive.

Keywords : n-dodecylthiol, conjugated PSC, P3HT/PCBM, polymer solar cells

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