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Random Conjugated Copolymers with Panchromatic Absorption for High-Efficiency Polymer Solar Cells JAE WOONG JUNG, WON HO JO, Seoul National University — One of the most important issues for polymer solar cells (PSCs) is to develop conjugated polymers with broad light absorption, high mobility and appropriate orientation to provide effective pathways to electrode. Particularly, the broad light absorption of the polymer is important to enhance the power conversion efficiency because the limited absorption leads to low current in comparison with other inorganic-based solar cells. A fascinating approach to extend light absorption is the synthesis of copolymers composed of several chromophores. Among various building blocks, diketopyrrolo[3,4-c]pyrrole (DPP) and 6,6'-[3,3']biindolylidene-2,2'-dione (isoindigo) have attracted much interest since they are easily accessible and exhibit promising optoelectronic properties. Here, we report random conjugated copolymers consisting of DPP and isoindigo as co-electron acceptor of donor-acceptor conjugated polymer. The random copolymers exhibited not only broad light absorption but also low-lying HOMO levels. Also, the predominant face-on orientation of the copolymers is beneficial for vertical charge transport in PSCs. The combination of excellent optoelectrical properties and favorable molecular conformation makes copolymers promising candidate for active material in high performance PSCs.

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