

Local structure and performance of bulk-heterojunction polymer solar cells measured by light-modulated scanning tunneling spectroscopy.

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To realize highly power-conversion efficient polymer solar cells, many researchers study solar cells with Bulk-Heterojunction (BHJ) structure. In order to proceed such studies, characterization of BHJ cells on nanoscale is necessary. In this study, we applied “Light-Modulated Scanning Tunneling Spectroscopy (LM-STs)” to BHJ polymer solar cells, and observed the local structure and performance on polymer solar cells. As samples, we prepared for two BHJ solar cells. One is made of MDMO-PPV:PCBM mixture, the other is P3HT:PCBM mixture. Figure 1. shows that result of LM-STs on the former. Figure 1 (a) is topographic image, (b) short circuit current (I_{sc}) mapping, (c) is open circuit voltage (V_{oc}) mapping. It can be seen that I_{sc} and V_{oc} varies with ~ 100 nm scales. On the presentation, we also present the result on the P3HT:PCBM mixture and discuss the difference in the spatial distribution of the performance in terms of the differences in the compositions and structures of the cells.

