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In Situ Annealing Study of Organic Photovoltaic Morphology via Non-invasive Polarized Neutron Reflectivity
BRETT GURALNICK, MICHAEL MACKAY, University of Delaware, BRIAN KIRBY, CHARLES MAJKRZAK, NIST Center for Neutron Science — Polarized neutron reflectivity, a non-invasive technique, allows the unambiguous density distribution within a thin film to be determined. By utilizing this technique with organic photovoltaics is it possible to study the same device pre- and post-annealing. We studied a bulk herterojunction cell consisting of an organic semiconductor (P3HT) and a nanoparticle electron acceptor (PCBM). We found a shift in the location of PCBM within the organic film which migrates toward the anode and cathode following annealing. However, while some PCBM can reach the substrate interface it never fully blooms to the air interface and pure P3HT resides at the surface for the thick (200 nm) films used in this study. These results differ from previous research in that the same device was characterized allowing a true study on the effect of annealing to be performed.

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