

Abstract Submitted  
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**Tunable morphology of P3HT: PCBM films by combinatorial methods for bulk heterojunction solar cells<sup>1</sup>** YAN SUN, GURPREET SINGH, ALAMGIR KARIM, University of Akron — P3HT: PCBM films for bulk heterojunction (BHJ) solar cells were processed by dynamic annealing method termed as cold zone annealing (CZA) with varying velocities in conjunction with a confining and conformal surface energy controlled polydimethylsiloxane (PDMS) capping layer on top. Morphologies and optical properties of P3HT: PCBM were investigated by atomic force microscopy, optical microscope and UV-Vis absorption spectroscopy. Effect of CZA annealing rate and surface energy of PDMS as well as CZA annealed films without PDMS on P3HT: PCBM morphologies were compared. It was observed that the growth of large PCBM crystals can be suppressed with the confining PDMS under CZA annealing conditions. The thermal expansion of PDMS is several times the BHJ film, so that there is significant shear effect on the BHJ under the confined annealing process. High resolution TEM was used for further investigation of the film morphology and the orientation of the P3HT in the BHJ was studied by UV-VIS absorption spectroscopy with polarized incident light and grazing incidence wide angle X-ray spectroscopy (GIWAXS) at a synchrotron source.

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