ENHANCED PASSIVATION OF P3HT:PCBM BULK HETEROJUNCTION PHOTOVOLTAIC DEVICES. ***J. Kolev,*** *B. Landi, R. Raffaelle*, NanoPower Research Laboratories, jnk1334@rit.edu, bjlsps@rit.edu, rprsps@rit.edu*

Polymer solar cells offer several advantages including solution processing and potential for lightweight and flexible devices. However, challenges presently include relatively low device efficiency and degradation of the polymer layers. To address these limitations, a series of experiments were performed to investigate the effects of time and temperature on device annealing and the use of UV curable polymers to improve efficiency. Devices composed of different PCBM[60/70] - ([6,6]-phenyl-$C_{61/71}$-butyric acid methyl ester) fullerene sizes were incorporated into conventional ITO/PEDOT:PSS/ P3HT:PCBM/Aluminum heterojunction devices. Current-voltage measurements were obtained under simulated one sun AM1.5 solar illumination. The results showed 175°C-180°C and a time of ten minutes produced the highest efficiency devices: 2.6% for PCBM[60] and 3.1% for PCBM[70] devices. A series of UV curable polymers were evaluated to minimize the deleterious effects from oxygen and moisture on the PCBM[70] devices. Passivated devices measured by time-dependent current-voltage sweeps exhibited a 20X greater lifetime compared to the control devices. These experiments demonstrate the improved efficiency with PCBM[70] through proper annealing and passivation techniques.