Utilizing Fullerene Optical Sensitizer to Realize Thin Film Organic Photodetector with High Detectivity and Thermal Stability

장민수, 정대성†, 윤성원, 심규민
대구경북과학기술원
(dchung@dgist.ac.kr†)

Organic photodetectors have achieved great interest in recent years due to their distinguishing characteristics such as color selectivity, flexibility and cost efficiency. In order to maximize these characteristics, it is essential to minimize the thickness of the fabricated device. The key to achieving such thin thickness is confining the optical sensitizer, [6,6]-phenyl-C71-butyric acid methyl ester (PCBM), on top of the active layer, poly(3-hexylthiophene) (P3HT). To do so, we have utilized sequential deposition technique using orthogonal solvent for each polymer. The PCBM sensitizer on top of the P3HT layer is confined arising a phenomenon known as photomultiplication. When light is induced, the PCBM sensitizer acts as electron trap site between the P3HT active layer and aluminum cathode. These trapped electrons induce columbic force, which assists hole injection from the aluminum cathode to the active layer. Due to these additionally injected holes, the performance of the device can be greatly enhanced without forming any percolation pathway even in a thickness of 150 nm.