Development of Semitransparent UV Photodetector Based on PTB7-Th:PCBM Composite Using the Cost-effective Fabrication Method

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This article presents a semitransparent ultraviolet (UV) sandwich-surface type sensor based on PTB7-Th: PCBM composite. The ultraviolet (UV) transparency of 29% was achieved through a cost-effective drop-cast fabrication method. The variation in UV intensity (0 to 20,000 $\mu\text{W}/\text{cm}^2$) and frequency (100 Hz, 1 kHz, 10 kHz, 100 kHz, and 200 kHz) was carried out, and variation of impedance and capacitance has been studied. After a comprehensive analysis under specific UV strength and frequency, a considerable increase in capacitance and a significant decrease in impedance were observed. The generation of electron-hole pair relates such findings by increasing the concentration of charges, combined potential, and possible frequency dependence of charge mobility under UV-irradiation. The UV sensor can be used for measuring the UV and visible light intensities. They have applications in the field of electronics and photonics.

Keywords: UV sensor, PTB7-Th: PCBM, semitransparent, sandwich-surface type sensor

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