

Fabrication of Organic Photovoltaics Using Transparent Conductive Films Based on Graphene and Metal Grid

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The characteristics of hybrid conductive films based on multilayer graphene and silver grid have been investigated for the high-performance and flexible organic solar cells. The hybrid conductive films have been prepared on glass and polyethylene terephthalate (PET) substrates using conventional photolithography process and transfer process of graphene. The optical and electrical properties of prepared conductive films show transmittance of 87% at 550nm and sheet resistance of 28 Ω /square. The electromechanical properties were also investigated in detail to confirm the flexibility of the hybrid films. OSCs have been fabricated on the hybrid conductive films based on graphene and silver grid on glass substrate. The power conversion efficiency of 2.38%, a fill factor of 51%, an open circuit voltage of 0.58V and a short circuit current of 8.05 mA/cm² were obtained from the device on glass substrate. The PCE was enhanced 11% compared with OSCs on the MLG films without silver grid.

Keywords: graphene, silver grid, organic solar cells

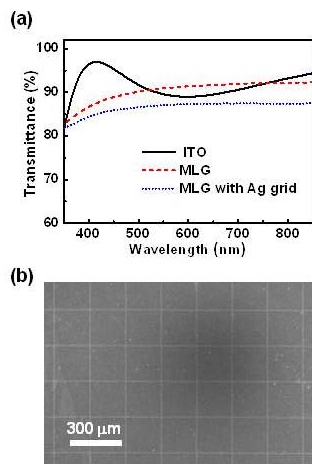


Fig. 1.

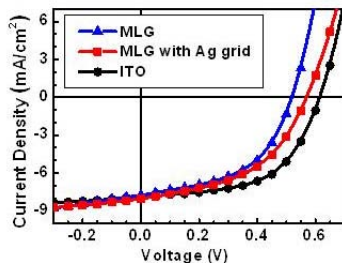


Fig. 4.

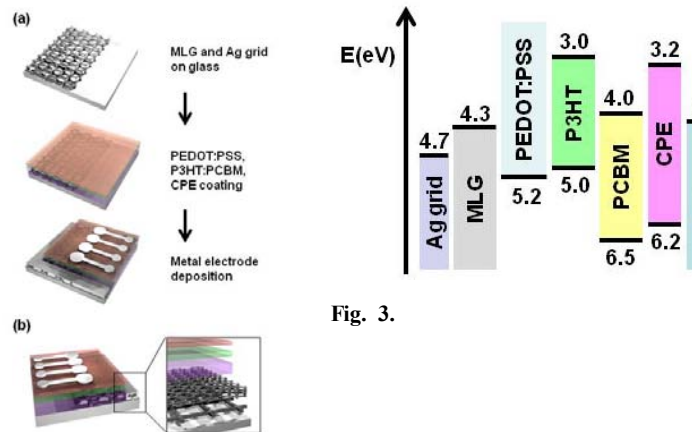


Fig. 3.

Fig. 2.

Table 1.

	ITO	MLG	MLG/Ag grid
Sheet resistance (Ω /square)	11.0 \pm 0.9	381 \pm 36	28.0 \pm 7.9

Table 2.

	V _{oc} (V)	J _{sc} (mA/cm ²)	FF (%)	PCE (%)
ITO	0.62	7.89	57	2.79
MLG	0.52	7.78	53	2.14
MLG with Ag grid	0.68	8.05	51	2.38