

Post Treatment of Gravure-Printed Layer for Organic Light Emitting Diode

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Gravure printing is popularly being used to mass-produced printing of newspapers, packing papers and other applications. Gravure printing technique has various merits including low processing temperature, low manufacturing cost, high processing speed, and roll-to-roll production capability. We have applied gravure printing technology to organic light emitting diode(OLED) fabrication.

PEDOT:PSS ([Poly(3,4-ethylenedioxythiophene) - poly(styrene sulfonate)]) was spin coated on the indium tin oxide coated glass substrate. And organic light emitting poly[2-methoxy -5-(2-ethylhexyloxy)-1,4-phenylenevinylene] (MEH-PPV) layer was formed by gravure printing process. In the gravure printing process, the organic emitting material is filled into the engraved metallic gravure roll and transferred to the substrate. However, typically the gravure printed layer showed non-flat surface with higher surface roughness than spin-coating processes. And this leads to non-uniform lighting and shortage of the circuit.

To control the roughness, thickness and uniformity of MEH-PPV organic layer, post-solvent treatment were performed with chloroform, chlorobenzene and 1,2-dichlorobenzene. The mixtures of the solvents were also tested. Post-solvent treatment in this work decreased thickness and roughness. And it also improved uniformity and flatness of gravure printed MEH-PPV layer. We also performed thermal annealing onto organic emitting layer. Thermal annealing treatment showed similar effect on thickness and roughness of organic emitting layer. The improvement of OLED performance was observed with the improved morphology of organic layers.