

Accepted Manuscript

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PII: S0040-6090(16)00105-X
DOI: doi: [10.1016/j.tsf.2016.02.015](https://doi.org/10.1016/j.tsf.2016.02.015)
Reference: TSF 35015

To appear in: *Thin Solid Films*

Received date: 7 April 2015
Revised date: 20 January 2016
Accepted date: 7 February 2016



Please cite this article as: Yu-Sheng Tsai, Apisit Chittawanij, Lin-Ann Hong, Siou-Wei Guo, Ching-Chiun Wang, Fuh-Shyang Juang, Shih-Hsiang Lai, Yang-Ching Lin, Multi-solution processes of small molecule for flexible white organic light-emitting diodes, *Thin Solid Films* (2016), doi: [10.1016/j.tsf.2016.02.015](https://doi.org/10.1016/j.tsf.2016.02.015)

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Multi-solution processes of small molecule for flexible white organic light-emitting diodes

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Abstract

Most small molecule organic light emitting diodes (SM-OLEDs) device structures are made in one layer using solution-based processing because the solution is usually a high dissolvent material that easily attacks the layer below it. We demonstrate a simple and reliable stamping technique for fabricating multi-solution process flexible white SM-OLEDs. The structure is anode/spin-hole injection layer/spin-emitting layer/stamping-electron transport layer/cathode. Poly(di-methyl silane) (PDMS) stamp is used for transferring electron transport layer. An intermediate ultraviolet-ozone surface treatment is introduced to temporarily modify the PDMS stamp surface. Then, the solution-based electron transport layer film can therefore be uniformly formed on top of the PDMS surface. After that the electron transport layer film on the PDMS stamp is transfer-printed onto the emitting layer with suitable heating and pressing. A solution-based processing is successfully established to efficiently fabricate flexible white SM-OLEDs. The SM-OLEDs were obtained at the current density of 20 mA/cm², luminance of 1062 cd/m² and current efficiency of 5.57 cd/A, and Commission internationale de l'éclairage coordinate of (0.32, 0.35).

Keywords: Organic light-emitting diodes; Solution process; Stamping transfer; Small molecule;

Multilayer.

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