

Spray Pyrolysis Technique Utilized for the Fabrication of Inverted Polymer Solar Cells

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Currently, polymer solar cells (PSCs) used for harnessing solar energy based on organic materials get more attention than silicone solar cells due to their lower weight, higher flexibility, lower manufacturing cost, short energy payback time as well as facile conjugation with other electronic applications [1]-[2].

Variety of thin film deposition techniques have been utilized for the fabrication of the PCs [3]-[4]. In our work, the fabricated PSCs have the inverted structure (iPSCs) as showed in Fig.1. In addition, the electron transporting layer used was ZnO which has been deposited by the lab-scale spin coating technique (ZnO-SC as a control cell) along with the spray pyrolysis technique (ZnO-SP as a case of investigation).

The obtained results in this research illustrated that both ZnO-SC and ZnO-SP have similar performance (10%) as demonstrated in Fig.2. But, the main advantages were not only high cells' performance but also the ability to fabricate the ZnO thin film with SP technique which is simple manufacturing process with low cost and reproducible technique [5]-[6]. Moreover, it can be promising technique to integrate the iPSCs for the industrial mass production scale as well as maintain the cells with efficient performance.

References

- [1] Gang Li, Rui Zhu, Yang Yang, nature photonics, 6 (2012), pp. 153.
- [2] S. K. Hau, H. L. Yip, A. K. Jen, Polymer Reviews J, 4 (2010), pp. 474.

- [3] Victor. S. Balderrama, J. G. Sánchez, G. Lastra, w. Cambarau, S. Arias, J. Pallarés, E. Palomares, M. Estrada, and L.F. Marsal, Journal of Materials Chemistry A, 45 (2018) 22534.
- [4] J. G. Sánchez, V. S. Balderrama, S. I. Garduño, E. Osorio, A. Viterisi, M. Estrada, J. F-Borrull, J. Pallarès and L. F. Marsal, no. 24 (2018), pp. 13094.
- [5] A. Tecaru, A. I. Danciu, V. Muşat, E. Fortunatoa, E. Elangovan, Optoelectronics and Advanced Materials, 9 (2010), pp. 1889.
- [6] Chi, C. Shih, E. Sauter, S. K. Das, Y. Liang, H. Lien, S. Chang, M. Zharnikov, Y. Tai, Materials Chemistry A, 15 (2018), pp. 6542.

Figures

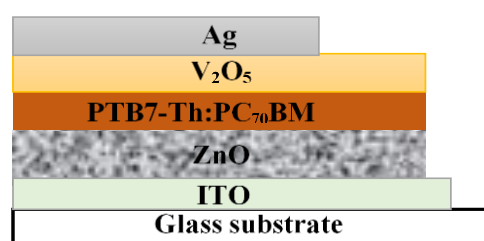


Figure 1: Structure of the Fabricated iPSC.

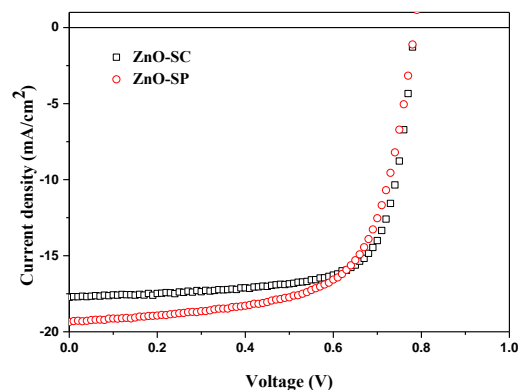


Figure 2: Current density - Voltage curve for ZnO-SC and ZnO-SP iPSCs.