

# OPTIMIZATION OF OUT COUPLING EFFICIENCY OF MICROCAVITY PLED

**Sanjay Tiwari**

S.O.S. In Electronics, Pt. Ravishankar Shukla University Raipur, India

Email: drsanjaytiwari@gmail.com

## Abstract

. The promise of inexpensive electronics has fuelled widespread interest in the field of organic / polymer electronics. Successful demonstration of all basic optoelectronics sdevices like lasers,[1] polymer light emitting diodes (PLEDs),[2] thin film transistors, photovoltaics (PVs) optical sensors have been realized in research laboratories and some of them are ready to serve commercial application. The PLED device incorporates a microcavity structure including a dielectric mirror formed on a glass substrate, an anode formed above the dielectric mirror, a polymer film layer formed above the anode, and a reflective electrode formed above the polymer film layer such that the cavity is formed in the polymer film layer by the dielectric mirror and the reflective electrode. The PLED device with microcavity structure can incorporate one or more phosphors deposited on an underside of the glass substrate such that light of additional wavelengths can be generated by the PLED device.

The microcavity color tunable polymer light-emitting diodes (PLEDs) with structure of distributed Bragg reflectors (DBR)/c-ZnO/F8BT[poly[(9,9-dioctylfluoren-2,7-diyl)-co-(1,4-benzo-{2,1'-3}-thiadiazole)/TFB poly(2,7-(9,9-di-n-octylfluorene)-alt-(1,4-phenylene((4-sec-butylphenyl) imino)-1,4-phenylene)) /Au were fabricated. The variation in the thickness of F8BT layer results in Orange and green light emissions with full width at half maximum (FWHM) of less than 30 nm. Furthermore, due to the effective improvement in the spontaneous emission within microcavity, the brightness and electroluminescent (EL) efficiency of the micro cavity PLEDs were significantly enhanced. The maximum brightness reached 17500 Cd/cm<sup>2</sup> and maximum luminescence efficiency of 0.33 Cd/A with very low turn on voltage 0.87 V was found which are over 1.5 times higher than those of non-cavity PLEDs.

**Keywords** Microcavity - Organic light-emitting diodes - Color tunable Polymer light emitting devices; light out-coupling techniques; external efficiency.

## References

[1]. I. D. W. Samuel, G. A. Turnbull, *Chem. Rev.* 107, **2007**, 1272.

[2]. R. H. Friend, R. W. Gymer, A. B. Homes, J. H. Burroughes, R. N. Marks, C. Taliani, D. D. C. Bradley, D. A. D. Santos, J. L. Brédas, M. Logdlund, W. R. Salaneck, *Nature*, 397, **2001**, 121.

[3] C. L. Lin, H.W. Lin, and C. C. Wu, *Appl. Phys. Lett.* 87, **2005**, 021101