11th International Conference
on Advanced Materials
Rio de Janeiro Brazil
September 20 - 25
ICAM2009

Hybrid Inorganic-Organic Light Emitting Diodes (HYLEDS): Relationship between charge carrier transport and efficiency

J. Albero,[a] A. Forneli,[a] E. Palomares,[a,b] E. Martinez-Ferrero[a]*

[a,] Institut Català d'Investigació Química (ICIQ), Avda. Països Catalans 16, 43007 Tarragona, Spain.
[b,] ICREA.

Hyleds represent a new alternative in the light generating optoelectronic devices due to their enhanced stability to air and oxygen moisture.[1,2] The use of an inert metal oxide like MoO_3 as hole injection layer at the counter electrode avoids the application of Ca or Ba that are very reactive to air, and thus, avoids the extra encapsulation steps. On the other hand, the electron injection layer is a metal oxide like TiO_2, ZnO or ZrO_2 that can be used to match the LUMO position of the light emitting material. Needless to say that the different metal oxide band gap give rise to different results.[3,4,5]

Finally, the light emitting layer consists in a conjugated polymer which molecular structure determines the emission wavelength, opening the possibility to tune the emitting colour from red to blue. The most important aspects of these devices are the correspondence between energetic levels of the components, the mobility of the charge carriers and the organic-inorganic interface since it will control the charge carrier eventual accumulation and their recombination.

For these reasons, the chemical preparation of the different solutions and the processing will determine the final efficiency. In this sense, we have studied the influence of several parameters on the semiconducting metal oxide layer in the final efficiency of the device, presenting the results in this communication.

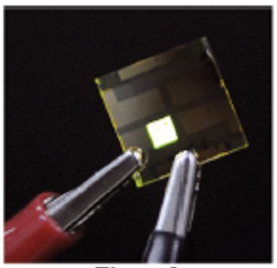

Figure 1

References:

1. K. Morii, M. Ishida, T. Takashima, T. Shimoda, Q. Wang, M. K. Nazeeruddin and M. Gratzel, *Applied Physics Letters*, 2006, **89**, 183510/1.

2. H. J. Bolink, E. Coronado, D. Repetto, M. Sessolo, E. M. Barea, J. Bisquert, G. Garcia-Belmonte, J. Prochazka and L. Kavan, *Advanced Functional Materials*, 2008, **18**, 145.

3. H. J. Bolink, E. Coronado, D. Repetto and M. Sessolo, *Applied Physics Letters*, 2007, **91**, 223501/1.

4. S. A. Haque, S. Koops, N. Tokmoldin, J. R. Durrant, J. Huang, D. D. C. Bradley and E. Palomares, *Advanced Materials*, 2007, **19**, 683.

5. N. Tokmoldin, N. Griffiths, D.D.C. Bradley, S.A. Haque, *Advanced Materials*, 2009, **21**, 1.