Hybrid Light Emitting Diodes as novel alternative to traditional light sources

Eugenia Martínez-Ferrero, Alberto Quintana

CETEMMSA, Avda. Ernest Lluch 36, Mataró, Spain
emartinez@cetemmsa.com

Abstract

Hybrid Light Emitting Diodes (HyLEDs) are novel electro-optic devices in which organic lumophores are combined with inorganic transition metal oxides that act as charge transport layers. The use of the metal oxides results in increased robustness, lower turn-on voltages, enhanced charge transport properties and stability in air of the devices. The enhanced resistance to air and oxygen moisture eliminates the need of encapsulating layers under operation making these devices very interesting for technological applications.

First reported in 2006,[1] research has revealed the potential of these type of devices which behave at the same performance level that the polymer organic light emitting diodes. Furthermore, the organic/inorganic interface has been improved through the reduction of the current leakage, the improvement of the charge injection or the enhancement of the exciton recombination rates.[2,3] Moreover, tuning the organic layer has resulted in light emission at different wavelengths. However, the transition from the laboratory to the industrial devices is hampered by the use of high sintering temperatures that impedes deposition on flexible substrate.

In this communication, we will analyze the potential of these hybrid LEDs and how they can be developed to reach better functionalities. Experimental results will be evaluated in view of the influence played by the morphology of the polymer and the changes at the organic-inorganic interface which are reflected in the luminance and efficiency values.

References

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