Fabrication of robust spin-OLEDs: Towards the control of emitted light with an external magnetic field.

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The fabrication of a spin-polarized electroluminescent device has been one of the major topics of organic spintronics in the last years. Still, only one report has been recently published which is based on the fabrication of an organic light emitting diode (OLED) with ferromagnetic electrodes [1]. The electrons and holes form two types of excitons (singlet and triplet) in a ratio 1:3. As the electroluminescence arises from the singlet excitons it is expected to control the emitted light by modulating the singlet:triplet ratio through the application of a magnetic field on the device [2-3].

In this contribution we present an approach based on the use of a HyLED (Hybrid Ligth Emitting Diode) structure which works simultaneously as a spin valve and an electroluminescent device at low temperatures. The main difference respect to OLED structures is the use of metallic oxides as electron injectors. This responds to the need of using an electrode which works as a cathode with a low work function [4]. In this way it is avoided the use of reactive metals giving more stability to the HyLED configuration respect to OLED one. Moreover this kind of configuration exhibits lower working voltages being energetically more efficient.
We have fabricated a HyLED structure using Fe or LSMO and Co as ferromagnetic electrodes in order to inject spin-polarized carriers in the active medium [5]. This new approach provides a real alternative for the fabrication of organic luminescent device with light emission modulated with external magnetic fields.

References

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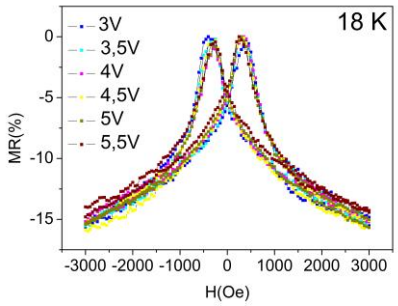

Fig. 1: MR loops of the LSMO-Co device at 18 K for high voltages.

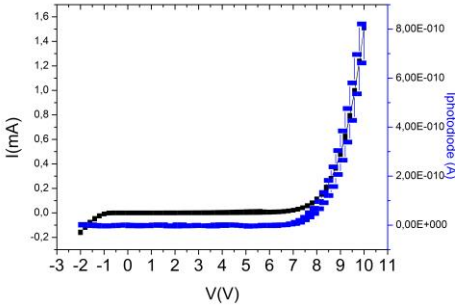

Fig 2: IVL characteristics of the LSMO-Co device measured at 13 K.