

Tuning colors in novel electroluminescent devices based on Al-indandionate complexes

I. F. Costa^{1*}, J. L. Moura¹, R. E. Adenes², H. F. Brito³, M. C. F. C. Felinto⁴, W. M. Faustino¹, M. Cremona², E. E. S. Teotonio¹

¹ Department of Chemistry, Federal University of Paraíba, João Pessoa, PB, Brazil. ² Department of Physics, Catholic Pontificia University of Rio de Janeiro, PUC-Rio, RJ, Brazil. ³ Department of Fundamental Chemistry, Institute of Chemistry, University of São Paulo, São Paulo, SP, Brazil. ⁴ Nuclear and Energy Research Institute (IPEN-CQMA), São Paulo, SP, Brazil.

* Corresponding author: israelqi@hotmail.com

In the past years, the development of materials for organic light-emitting diodes (OLEDs) have attracted much attentions [1]. In this sense, the present work reports about syntheses, characterization, Photo (PL) - and electroluminescence (EL) properties of Al-indandionate complexes of formula $[\text{Al}(\text{aind})_3]$, where aind: 2-acetyl-1,3-indandionate (acind), 2-benzoyl-1,3-indandionate (bind) or 2-(4-methyl)benzoyl-1,3-indandionate (mbind). These complexes were characterized by elemental analyses, Fourier-infrared absorption spectroscopy, thermogravimetric analyses and ¹H-NMR. Photoluminescent spectra of the complexes in both powder and thin film exhibited overlapped broad bands associated to both fluorescence and phosphorescence (see time-resolved spectra, Fig. 1a) phenomena. The electroluminescent devices of configuration ITO/ β -NPB/ $\text{Al}(\text{aind})_3/\text{LiF}/\text{Al}$ (1) exhibited emission in the red spectral region associated to electrophosphorescence (figure 1.b). On the other hand, the three layers devices of configuration ITO/ β -NPB/spiro-2CBP/ $\text{Al}(\text{aind})_3/\text{Al}$ (2) showed an intensity band in green spectral region (figure 1.b). The OLEDs presented emission from low voltage (~8V), reaching the highest intensity around 16 V. According to these results, the Al-indandionate complexes act as both efficient electron transporters and emitting layers. In addition, these data suggest that TADF process is operative in the bilayer devices.

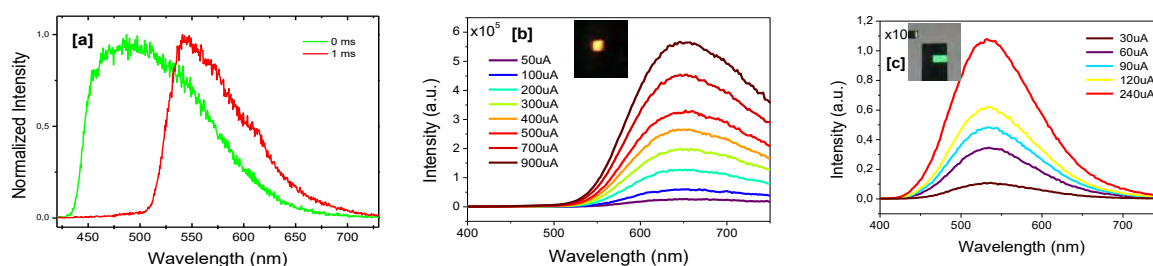


Fig. 1. Photo - and electroluminescence spectra of complex $\text{Al}(\text{acind})_3$: (a) PL time-resolved spectra (b and c) EL spectra of the ITO/NPB/ $[\text{Al}(\text{acind})_3]/\text{LiF}/\text{Al}$ and ITO/NPB/spiro-2CBP/ $\text{Al}(\text{aind})_3/\text{Al}$ devices.

Keywords: Electroluminescence, Al-Indandionate complexes, Tuning emitting colors.

Acknowledgements

This work was supported by CNPq, CAPES and inct-INAMI.

References

[1] Y. Tao, K. Yuan, T. Chen, P. Xu, H. Li, R. Chen, C. Zheng, L. Zhang, W. Huang, *Adv. Mater.* 26, (2014), 7931–7958.