LIGHT EMITTING ELECTROCHEMICAL CELL'S WITH RUTHENIUM AND IRIDIUM ORGANOMETALLIC COMPLEX'S

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One of the latest types of organic light-emitting devices (OLEDs) makes use of ionic charges to facilitate electronic charge injection from the metal electrodes into the organic or inorganic molecular semiconductor. These ionic charges facilitate electronic charge injection into the light-emitting film independent of the metallic electrode employed, opening the road for unencapsulated stable devices. Additionally, these devices have a larger tolerance to the thickness of the emitting layer, which facilitates the production process.

More recently, the focus has shifted to organometallic compounds that yield single component solid-state light-emitting devices. The compound most widely used in these single-component devices is tris(bipyridine) ruthenium ($Ru(bpy)_3^{2+}$), balanced by a large negative counterion such as hexafluorophosphate. Nevertheless, the LECs still have a low stability, ranging from several hours to days, and a limited amount of colours available.

It describes the performance of a LEC based ruthenium complex tris(4,7diphenyl-1,10-phenanthroline)ruthenium(II) ($Ru(dpp)_3^{2+}$), in LEC devices, as this complex exhibits photoluminescence quantum yields 6 times higher than the ($Ru(dpp)_3^{2+}$).

And the performance of a LEC based on iridium tris(2-phosphonatophenylpyridine) ($Ir(ppy\text{-}Pbu_3)_3$:$(PF_6)_3$). In this molecule the metal to ligand interaction is essentially the same as that in the $Ir(ppy)_3$ complex, but it contains a net positive charge. Using a tris(trisbutylphosponium-phenylpyridine) iridium complex we have prepared the first green light emitting single layer solid state electrochemical cell.

References:

[1] Henk J. Bolink, Luca Cappelli, Eugenio Coronado, Michael Gretzel and Md. K. Nazeeruddin. *JACS* **128**,(2006), 46
[2] Henk J. Bolink, Luca Cappelli, Eugenio Coronado and Pablo Gaviña. *Inorg Chem.* **Vol 44 (17),** (2005), 5966

Figures:

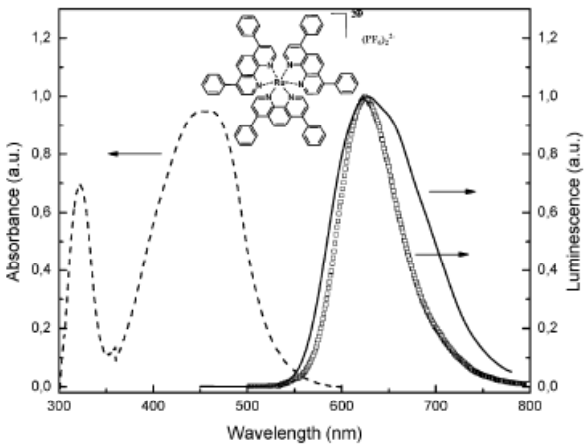

Figure 1. Absorption (dashed line), photoluminescence (open squares), and electroluminescence (solid line) spectrum of a thin film of $Ru(dpp)_3^{2+}$: PMMA. Inset: chemical structure of $Ru(dpp)_3^{2+}$:$(PF_6)^-_2$.