

# Synthesis and photophysical studies of a new iron(II) complex based in a pyridine-2-carboxyaldehyde azine ligand.

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Highly luminescent coordination compounds have recently attracted much attention due to interest in applications such as biological imaging, photochemical catalysis, highly efficient luminescent devices and luminescent sensors.<sup>1</sup> The simple but powerful strategy for designing luminescent coordination compounds is to organize metal ionic centers with a range of chromophore ligands forming mononuclear or polynuclear compounds, thus creating a wide variety of complexes which range from discrete entities to 3d systems. For luminescent coordination compounds, the origins of emission either arise from the transitions of  $\pi^*-\pi$  within a ligand or charge transfer between different moieties of a coordination compound. The intraligand  $\pi^*-\pi$  emission could be efficiently enhanced in a coordination compound due to the chelate effect. The complex was prepared by adding slowly an  $\text{Fe}(\text{BF}_4)_2 \cdot 6\text{H}_2\text{O}$  solution in dry acetonitrile to a dry solution of the ligand bpmhy (bis(2-pyridinyl-methylene)hydrazine)<sup>2</sup> forming a red solution, which, after several hours became blue. The solution was filtered off and left to stand. The resulting blue product was collected and washed with diethyl ether. The complex was characterized by different spectroscopic techniques, cyclic voltammetry (CV), mass spectrometry, X-ray diffractometry and its structure is shown in Figure 1. The CV experiment of the complex in  $\text{CH}_3\text{CN}$  reveals an irreversible process at  $E_{1/2} = 1.17 \text{ V}$  which can be assigned to the one electron redox couple  $\text{Fe}^{\text{II}}/\text{Fe}^{\text{III}}$  and other two process attributed to a reduction of the imine groups in the ligand. The electronic spectrum shows a broad band at 650 nm ( $3615 \text{ mol}^{-1} \text{ L} \cdot \text{mol}^{-1}$ ) assigned to a metal-to-ligand charge transfers (MLCT,  $d_{\text{Fe}} \rightarrow p\pi^*$ ) transition. Another band observed at higher energy can be attributed to intraligand charge-transfer transitions (325 nm;  $57615 \text{ mol}^{-1} \text{ L} \cdot \text{mol}^{-1}$ ). The photoluminescence spectra have two distinct regions. The first one gave the primary excited state emissions in the UV region (288 nm) and a large Stokes shifted secondary emissions in the green region of the visible spectrum (568 nm). In summary, was presented in this work the synthesis and characterization of an iron complex with the pyridine-2-carboxyaldehyde azine ligand and preliminary photophysical studies.

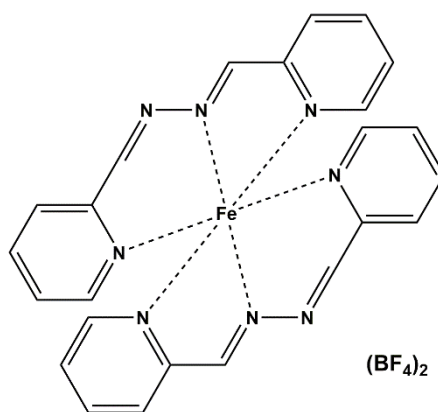


Figure 1. Structure of the complex  $[\text{Fe}(\text{bpmhy})_2](\text{BF}_4)_2$

## References

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