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Fluorescent interaction Eu-IL: when the anion plays a role

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Ionic Liquids (ILs) are well-known for their advantageous properties. Their wide use has led to a growing interest both on the improvement of the properties and the minimisation of environmental impact. In the light of this, in this work, we synthesized imidazolium ILs (imILs) bearing on the cation structure a moiety deriving from natural starting materials (Figure 1-a).

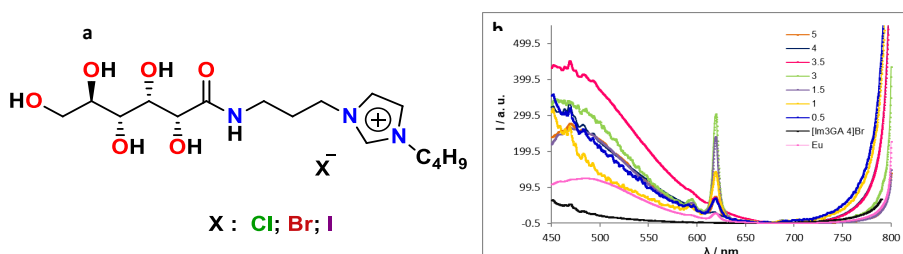


Figure 1: a) structure of imILs synthesised; b) fluorescence spectra increasing ligand/Eu ratio for the system: $[\text{Im}_3\text{GA}_4]\text{Br} + \text{Eu}^{3+}$ in $[\text{C}_1\text{C}_4\text{pyrr}][\text{NTf}_2]$.

Despite of the aromatic nature of the cation, these imILs showed very low cyto- and eco-toxicity.¹ Their tunable structure led us to study the possible formation of complexes with Eu^{3+} ion (from $\text{Eu}(\text{NO}_3)_3$ hydrate salt). Indeed, the combination of ILs with *f*-element compounds could be the way to design new luminescent materials for organic light-emitting diodes (OLEDs).²

The interaction among imILs and Eu^{3+} was studied recording fluorescence spectra (Figure 1-b) at different ligand/ Eu^{3+} ratios to achieve the highest luminescence in solution. Fluorescence intensity depends on the halo-anions of the ligands, indeed the different chemical interaction “cation-halo-anion”³ in IL ligand affects the coordination and the fluorescence properties of the complexes.

Moreover, the effect due to the nature of the solvent used to dissolve Eu salt and IL ligand was also studied.

For all the systems the Jobs plots were recorded to study the stoichiometry of the complexes. These systems were also investigated by using ^1H NMR. Conductivity investigation was also performed.

These preliminary analyses allowed obtaining promising results and further investigation will be carried out to obtain red-fluorescent materials.

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