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IMIDAZOLIUM AND PYRROLIDINIUM IONIC METALLOMESOGENS WITH PENDANT MESOGENIC GROUPS

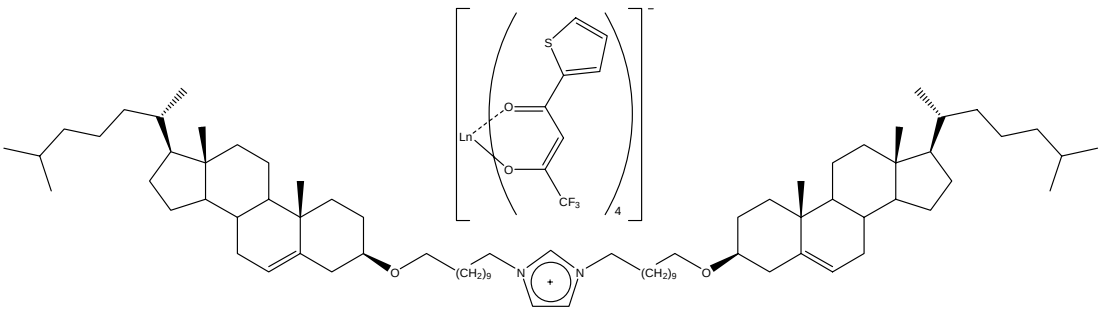
Karel Goossens,[a] Kathleen Lava,[a] Peter Nockemann,[a] Kris Driesen,[a] Christiane Görller-Walrand,[a] Kristof Van Hecke,[a] Luc Van Meervelt,[a] Koen Binnemans,[a] and Thomas Cardinaels[a]

[a] *Katholieke Universiteit Leuven, Department of Chemistry, Celestijnenlaan 200F, B-3001 Leuven, Belgium.*

Ionic liquid crystals are currently receiving a great deal of interest, especially as a consequence of the growing research in the field of ionic liquids [1]. Two strategies were followed to obtain thermotropic ionic liquid crystals: (i) 1-methylimidazole, imidazole and 1-methylpyrrolidine were connected to a flexible spacer with *terminally* attached mesogenic groups (*e.g.* 4-cyanobiphenyl and cholesteryl); (ii) 1-methylimidazole, imidazole and 1-methylpyrrolidine were connected to a flexible spacer with *laterally* attached mesogenic groups. The cations thus obtained were combined with Br^-, $(CF_3SO_2)_2N^-$, $[Ln(tta)_4]^-$ (Ln = Eu, Nd; tta = 2-thenoyl-trifluoroacetonate) and $[UO_2Br_4]^{2-}$. Although imidazolium and pyrrolidinium bromides with ordinary long alkyl chains are liquid-crystalline, these are not suitable to obtain ionic metallomesogens, as the bulky metal-containing anion cannot be counterbalanced by such cations.

The compounds with terminally attached mesogenic groups generally show monotropic or enantiotropic smectic A and/or smectic C phases. For certain compounds a nematic phase can be observed, which is rare for ionic products. Usually, ionic systems have the tendency to organize themselves into layers. Compound **1** presents the first example of a luminescent, liquid-crystalline lanthanide tetrakis β-diketonate. Structural models for the mesophases are presented.

Lateral substitution of the organic cation with mesogenic groups leads to a sharp decrease in melting point. The 'T-shaped' mesogens will hopefully lead to ionic metallomesogens exhibiting a nematic or chiral nematic mesophase.



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The europium(III) complexes show an intense red photoluminescence, while the neodymium(III) compounds are near-infrared emitting complexes. The uranyl compounds show luminescence in the visible region.

References:

[1] Binnemans, K. *Chem. Rev.* **2005**, *105*, 4148-4204.