MISCIBILITY STUDIES ON Ni(II) AND Co(III) LUMINESCENT METALLOMESOGENS

Evelyn Popa, **Carmen Cretu, Ildiko Buta, Elisabeta I. Szerb**

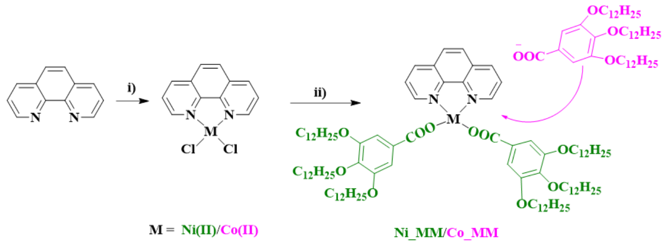
"Coriolan Drăgulescu" Institute of Chemistry, Romanian Academy, 24 Mihai Viteazu Bvd.,
300223, Timisoara, Romania
e-mail: pevelyn@acad-icht.tm.edu.ro

Abstract

Metallomesogens (MMs), are a class of metal-containing liquid crystals that merge the anisotropic properties of liquid crystals with the unique electronic and magnetic characteristics of coordination complexes [1]. The promise of carefully crafted advanced materials for applications in electro-optics, sensing, and biomedicine [2] depends critically on understanding how molecular structure dictates function, which in turn is influenced by the 'soft' supramolecular order yielding tunable properties of these systems.

Our aim was to synthesize isostructural nickel(II) and cobalt(II) analogues using the same N^N chelating and O-monoanionic gallate ligands following our previous investigation of octahedral, heteroleptic zinc(II) and copper(II) MMs [3]. The key was to explore the formation of heterobimetallic liquid crystalline luminescent ordered blends with synergistic properties. Despite using the same synthetic protocol, the two new complexes exhibited different molecular geometries due to the stereochemical preferences of the metal ions (Scheme 1). The nickel(II) complex adopted an octahedral structure mirroring its counterparts with Zn(II) and Cu(II) [3]. Surprisingly, the cobalt(II) precursor underwent an in-situ oxidation to cobalt(III) during the final step, leading to the formation of a five-coordinate, neutral heteroleptic complex. This finding underscores the profound influence of the metal center on the final molecular geometry, and reveals a rare coordination motif for cobalt.

Miscibility studies in the liquid crystalline state were performed by obtaining blends with different mass ratio of the precursors and the photophysical properties of the MMs precursors and blends will be presented.



Scheme 1. Synthesis of Ni_MM and Co_MM. Conditions: i) MCl_2, EtOH, r.t., 24 hours; ii) $Ag[OOCC_6H_2(OC_{12}H_{25})_3]$, $CHCl_3$/MeOH, r.t, 24 hours.

Acknowledgements

We acknowledge the Romanian Academy, Program 4 and the project ROOPENSCREEN, MySMIS code: 127952, Contract no. 371/20.07.2020, co-financed by European Regional Development Fund through the Competitiveness Operational Program 2014-2020, for support.

References

[1] D. Pucci, B. Donnio, Handbook of Liquid Crystals, W. Goodby, P. J. Collings, T. Kato, C. Tschierske, H. Gleeson, P. Raynes (Eds.), Wiley-VCH, Weinheim, 2014, pp. 1-67.

[2] H. Hakemi, Nanotechnology and Advanced Materials Science, 6 (2023) 1.

[3] C. Cretu, E. Popa, G. Di Maio, A. Candreva, I. Buta, A. Visan, M. La Deda, B. Donnio, E. I. Szerb, Chem. Commun., 59 (2023) 10616.