Novel 2D coordination polymers of La(III) and Ce(III), doped with Eu(III), Tb(III), Sm(III) and Dy(III): synthesis and luminescence properties

P.G. Derakhshandeh,[1] A.M. Kaczmarek,[1] J. Soleimannejad,[2] R. Van Deun,[1] K. Van Hecke[1]

1. Department of Inorganic and Physical Chemistry, Ghent University (UGent), Ghent, Belgium

2. School of Chemistry, College of Science, University of Tehran, Tehran, Iran

Recently, lanthanide-based coordination polymers have attracted great attention because of their ability to provide potentially porous materials and their interesting luminescence properties. In particular, these framework-based materials can efficiently be used in light conversion molecular devices (LCMD), in which light is absorbed by the coordinated ligands and then transferred to the emitting metal ion, ultimately increasing the overall photoluminescent properties. A great diversity of organic ligands such as β-diketonates, aromatic carboxylates or heterocyclic ligands have been strategically designed and used on the lanthanide-based coordination polymers synthesis. But, very few works deal with the optimization of the metallic centers [1,2].

Here, we report two novel 2D lanthanide-based coordination polymers, $[La(pzdc)(pzdcH)(H_2O)_3]_n$, $[Ce(pzdc)(pzdcH)(H_2O)_3]_n$ (pzdc = 2,3 pyrazinedicarboxylic acid), which were obtained under reflux conditions. We have studied the capability of these materials for mechanochemical doping with the luminescent lanthanide ions Sm^{3+}, Eu^{3+}, Tb^{3+}, and Dy^{3+}. Additionally, we have investigated the optical excitation and emission properties of the host lattice in detail. We thereby want to examine the possibility of enhancing the luminescence properties of Sm^{3+}, Eu^{3+}, Tb^{3+}, and Dy^{3+} with the energy transfer between the La(III) or Ce(III) centers to the luminescent lanthanide ions.

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