

Eu³⁺ ion as a spectroscopic local structural probe in heterometallic Pb(II)/Eu(III) coordination polymers

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Coordination polymers (CPs) and Metal-Organic Frameworks (MOFs) constitute one of most ionic classes of hybrid materials having received a wide scientific attention.¹ New photoluminescent 6p–4f heterometallic CPs, based on distinct Pb²⁺/Eu³⁺ ratios and 1,4-benzenedicarboxylic acid (BDC) were prepared. Whereas for $x = 0.05$ and 0.10 the Pb_{1-x}Eu_x-BDC compounds are structurally similar to [Pb(BDC)]_n, for $x = 0.50$ and 1.00 the CPs exhibit the structure of the [Eu₂(BDC)₃(H₂O)₄] hydrated phase. The Pb_{0.75}Eu_{0.25}-BDC material display a mixture of both crystalline phases with a surprising high emission quantum yield ($69 \pm 7\%$). Moreover, site-selective and time-resolved spectroscopy enabled the detailed study of the two Eu³⁺ local sites in this CPs illustrating how powerful the Eu³⁺ luminescence is as a local probe spectroscopic tool.

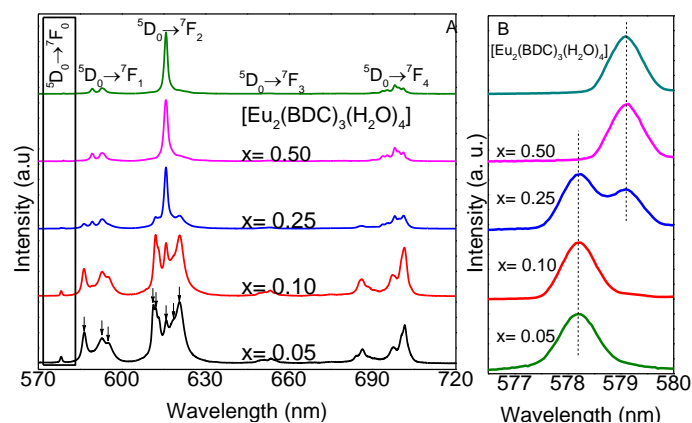


Fig. 1 (A) Emission spectra (300 K) of Pb_{1-x}Eu_x-BDC and [Eu₂(BDC)₃(H₂O)₄] excited at 315 nm. The arrows identify the Stark components of the ⁵D₀→⁷F_{1,2} transitions for $x=0.05$ and 0.10 . (B) Magnification of the ⁵D₀→⁷F₀ transitions.

(1) J. Heine and K. Muller-Buschbaum, *Chem. Soc. Rev.*, **2013**, 42, 9232.

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