Temperature dependent structure of 3D lanthanide coordination polymers

Suwadee Jiajaroen¹, Nutcha Ponjan¹, Phailyn Khemthong², Filip Kielar², Kittipong Chainok¹
¹Faculty Of Science And Technology, Thammasat University, Pathum Thani, Thailand, ²Department of Chemistry, Faculty of Science, Naresuan University, Phitsanulok, Thailand
E-mail: suwadee_jiajaroen@hotmail.co.th

Four series of lanthanide coordination polymers with mixed dicarboxylate ligands, [Ln(fum)1.5(H2O)2]·0.5(H2tp)·H2O, (1Ln, Ln = Sm, Eu, Gd, Tb, Dy, Er), [Ln2(fum)2(tp)(H2O)4]·2H2O (2Ln, Ln = Sm, Eu, Gd, Tb, Dy, Er), [Ln(fum)0.5(tp)] (Series 3Ln, Ln = Sm, Eu, Gd, Tb, Dy, Er), and [Ln(tp(ox)0.5):H2O (4Ln, Ln = Sm, Eu, Gd, Tb, Dy, Er) have been prepared hydrothermally at different temperatures. Isomorphous polymers 1Ln crystallize in the triclinic space group P-1 and feature a 3D framework with 4,5-connected tcs (44.62)(44.66) topology. Polymers 2Ln crystallize in the monoclinic polar space group P21 and present a 2-fold interpenetrated 3D network with 6-connected pcu (412.63) topology. Polymers 3Ln crystallize in the orthorhombic space group Pbca and possess a 3D framework with an unprecedented (4,7)-connected (42.52.72)(42.53.75) topology. Polymers 4Ln crystallize in the monoclinic space group P21/c and exhibit a 3D network with 4,5-connected tcj/hc (42.52.72)(42.53.75) topology. The thermal stability and photoluminescent properties of Eu(III) and Tb(III) compounds were investigated in detail.

Keywords: Hydrothermal synthesis, Lanthanide coordination polymers, Luminescence