Lanthanide coordination polymers with tetrafluoroterephthalate as a bridging ligand: thermal and optical properties.

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Rok wydania

2012

Czasopismo

Inorganic Chemistry

Numer woluminu

51

Strony

4679-4688

DOI

10.1021/ic202655d

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

By slow diffusion of triethylamine into a solution of 2,3,5,6-tetrafluoroterephthalic acid (H_2tfBDC) and the respective lanthanide salt in EtOH/DMF single crystals of seven nonporous coordination polymers, $_\infty^2$[Ln(tfBDC)(NO_3)($DMF)_2$]·DMF (Ln^{3+} = Ce, Pr, Nd, Sm, Dy, Er, Yb;*C*2/*c*, *Z* = 8) have been obtained. In the crystal structures, two-dimensional square grids are found, which are composed of binuclear lanthanide nodes connected by $tfBDC^{2-}$ as a linking ligand. The coordination sphere of each lanthanide cation is completed by a nitrate anion and two DMF molecules (CN = 9). This crystal structure is unprecedented in the crystal chemistry of coordination polymers based on nonfluorinated terephthalate (BDC^{2-}) as a bridging ligand; as for $tfBDC^{2-}$, a nonplanar conformation of the ligand is energetically more favorable, whereas for BDC^{2-}, a planar conformation is preferred. Differential thermal analysis/thermogravimetric analysis (DTA/TGA) investigations reveal that the noncoordinating DMF molecule is released first at temperatures of 100–200 °C. Subsequent endothermal weight losses correspond to the release of the coordinating DMF molecules. Between 350 and 400 °C, a strong exothermal weight loss is found, which is probably due to a decomposition of the $tfBDC^{2-}$ ligand. The residues could not be identified. The emission spectra of the $_\infty^2$[Ln(tfBDC)(NO_3)($DMF)_2$]·DMF compounds reveal intense emission in the visible region of light for Pr, Sm, and Dy with colors from orange, orange-red, to warm white.

Adres publiczny

https://doi.org/10.1021/ic202655d

Strona internetowa wydawcy

https://www.acs.org/content/acs/en.html