

# Author's Accepted Manuscript

## Rare Earth Niobate Coordination Polymers

Collin N. Muniz, Hiral Patel, Dylan B. Fast,  
Lauren E.S. Rohwer, Eric W. Reinheimer,  
Michelle Dolgos, Matt W. Graham, May Nyman



PII: S0022-4596(17)30522-4  
DOI: <https://doi.org/10.1016/j.jssc.2017.12.034>  
Reference: YJSSC20076

To appear in: *Journal of Solid State Chemistry*

Received date: 9 November 2017  
Revised date: 27 December 2017  
Accepted date: 31 December 2017

Cite this article as: Collin N. Muniz, Hiral Patel, Dylan B. Fast, Lauren E.S. Rohwer, Eric W. Reinheimer, Michelle Dolgos, Matt W. Graham and May Nyman, Rare Earth Niobate Coordination Polymers, *Journal of Solid State Chemistry*, <https://doi.org/10.1016/j.jssc.2017.12.034>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Rare Earth Niobate Coordination Polymers

Collin N. Muniz,<sup>1,2</sup> Hiral Patel,<sup>2</sup> Dylan B. Fast,<sup>1</sup> Lauren E. S. Rohwer,<sup>3</sup> Eric W. Reinheimer,<sup>4</sup> Michelle Dolgos,<sup>1</sup> Matt W. Graham,<sup>2</sup> May Nyman<sup>1\*</sup>

<sup>1</sup>Department of Chemistry & <sup>2</sup>Department of Physics, Oregon State University, Corvallis, OR 97331, USA

<sup>3</sup>Microsystem Integration Department, Sandia National Laboratories, Albuquerque, NM 87185, USA

<sup>4</sup>Rigaku Oxford Diffraction, 9009 New Trails Drive, The Woodlands, TX 77381, USA

\*corresponding author: may.nyman@oregonstate.edu; <http://nyman.chem.oregonstate.edu/>

KEYWORDS: lanthanides; rare earths; coordination polymers; luminescence; europium; terbium

## ABSTRACT

Rare-earth (RE) coordination polymers are infinitely tailorable to yield luminescent materials for various applications. Here we described the synthesis of a heterometallic rare-earth coordination compound  $((\text{CH}_3)_2\text{SO})_3(\text{RE})\text{NbO}(\text{C}_2\text{O}_4)_3$  ( $(\text{CH}_3)_2\text{SO}$  = **dimethylsulfoxide, DMSO**), ( $\text{C}_2\text{O}_2$  = **oxalate**), (**RE=La, Ce, Pr, Nd, Sm, Eu, Gd, Tb**). The structure was obtained from single crystal X-ray diffraction of the La analogue. The Nb=O and DMSO terminal-bonding character guides assembly of an open framework structure with noncentrosymmetric RE-coordination geometry, and large spacing between the RE centers. A second structure was observed by PXRD for the smaller rare earths (Dy, Ho, Er, Yb); this structure has not yet been determined. The materials were further characterized using FTIR, and photoluminescence measurements. Characteristic excitation and emission transitions were observed for RE = Nd, Sm, Eu, and Tb. Quantum yield (QY) measurements were performed by exciting Eu and Tb analogues at 394 nm (QY 66%) and 464 nm (QY 71%) for Eu; and 370 nm (QY=40%) for Tb. We attribute the high QY and bright luminescence to two main structure-function properties of the system; namely the absence of water in the structure, and absence of concentration quenching.

Download English Version:

<https://daneshyari.com/en/article/7757823>

Download Persian Version:

<https://daneshyari.com/article/7757823>

[Daneshyari.com](https://daneshyari.com)