Support information

Breaking the strong 1D growth habit to yield quasi-equiaxed REPO$_4$ nanocrystals (RE=La-Dy) via solvothermal reaction and investigation of photoluminescence

Zhihao Wang,\textsuperscript{a,b,c} Xiaofei Shi,\textsuperscript{a,b,c} Xuejiao Wang,\textsuperscript{*d} Qi Zhu,\textsuperscript{a,b} Byung-Nam Kim,\textsuperscript{c} Xudong Sun,\textsuperscript{a,b,e} Ji-Guang Li\textsuperscript{*a,b,c}

\textsuperscript{a} Key Laboratory for Anisotropy and Texture of Materials (Ministry of Education), Northeastern University, Shenyang, Liaoning 110819, China
\textsuperscript{b} Institute for Ceramics and Powder Metallurgy, School of Materials Science and Engineering, Northeastern University, Shenyang, Liaoning 110819, China
\textsuperscript{c} Research Center for Functional Materials, National Institute for Materials Science, Tsukuba, Ibaraki 305-0044, Japan
\textsuperscript{d} College of New Energy, Bohai University, Jinzhou, Liaoning 121013, China
\textsuperscript{e} Liaoning Engineering Laboratory of Special Optical Functional Crystals, School of Environment and Chemical Engineering, Dalian University, Dalian, Liaoning 116622, China

*Corresponding author

Dr. Xuejiao Wang
Bohai University
Tel: +86-416-3400708
E-mail: Wangxuejiao@bhu.edu.cn

Dr. Ji-Guang Li
National Institute for Materials Science
Tel: +81-29-860-4394
E-mail: li.jiguang@nims.go.jp
Fig. S1 XRD pattern and SEM image (the inset) of the precipitate obtained at room temperature.

Fig. S2 Intensity ratio $R$ of (200) to (102) diffractions as a function of the solution pH.

Fig. S3 Intensity ratio $R$ of (200) to (102) diffractions as a function of the EG content.
Fig. S4 Plots of the analyzed lattice constants (a) and cell volume (b) of m-/h-REPO₄ crystals against the effective ionic radius of RE³⁺.

Fig. S5 Rietveld refinement of the XRD patterns for the products calcined at 700 (a), 800 (b), and 900 °C (c) using the existing crystallographic data of h- and m-­GdPO₄ as initial structure models. The red, black, and gray lines represent the observed XRD profiles, calculated XRD profiles, and the difference between the two, respectively. The Bragg reflections for h- and m-GdPO₄ are indicated with blue and green tick marks, respectively. It is clearly seen that the 700 and 900 °C products are of phase-pure h- and m-GdPO₄, respectively, while the 800 °C product is a mixture of the two (m-GdPO₄ content: about 93.7%).
Fig. S6 A Schematic model for the energy transfer from Gd$^{3+}$ to Dy$^{3+}$. 