Supporting Information

Liquid crystalline behavior and photoluminescence of lanthanide decanoate nanoparticles synthesized by microwave radiation

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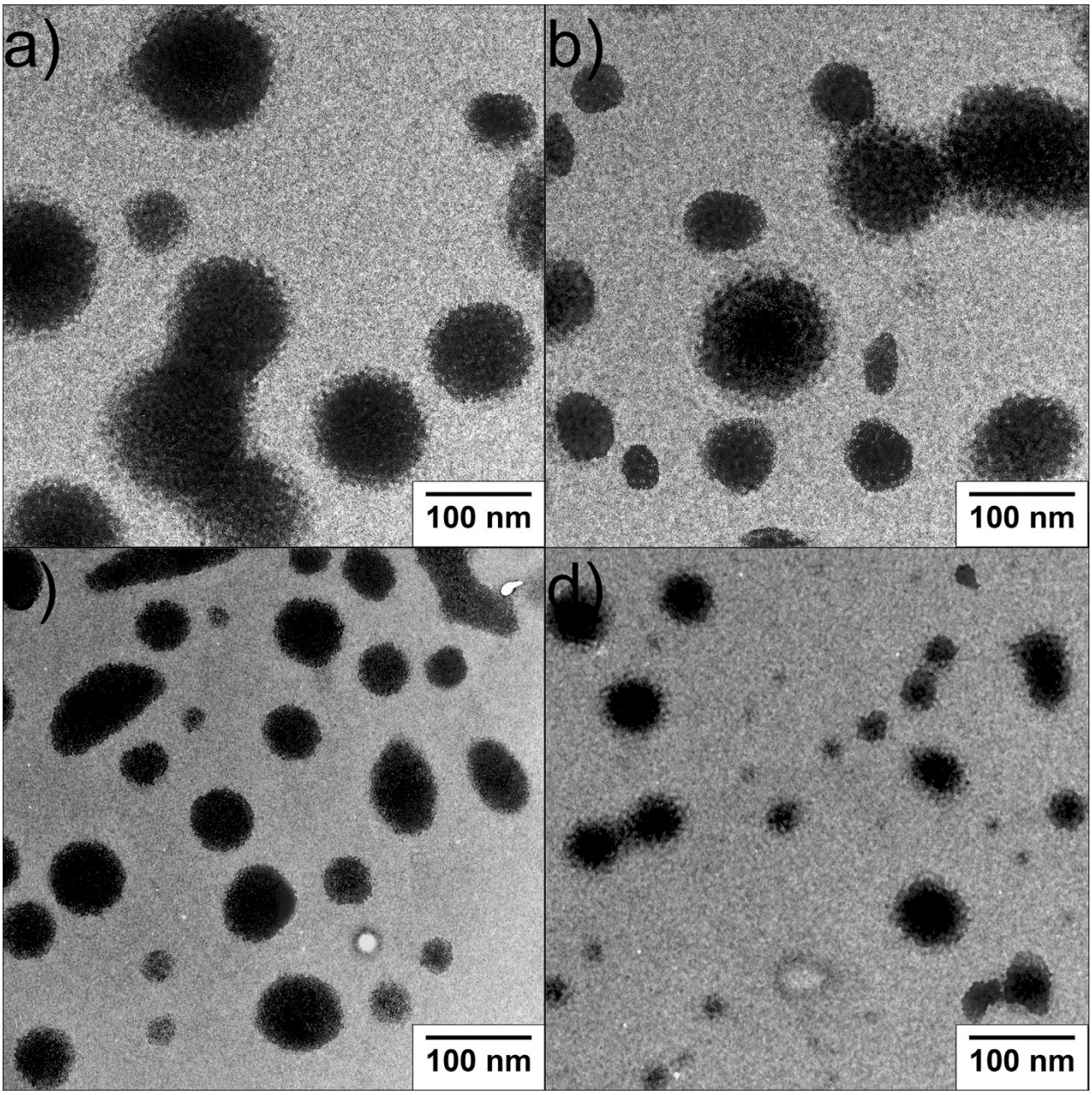

Figure S1. TEM micrographs of products obtained from the solvothermal microwave synthesis of decanoic acid with various lanthanide nitrate precursors. (a) $Pr(NO_3)_3$; (b) $Nd(NO_3)_3$; (c) $Gd(NO_3)_3$; (d) $Er(NO_3)_3$.

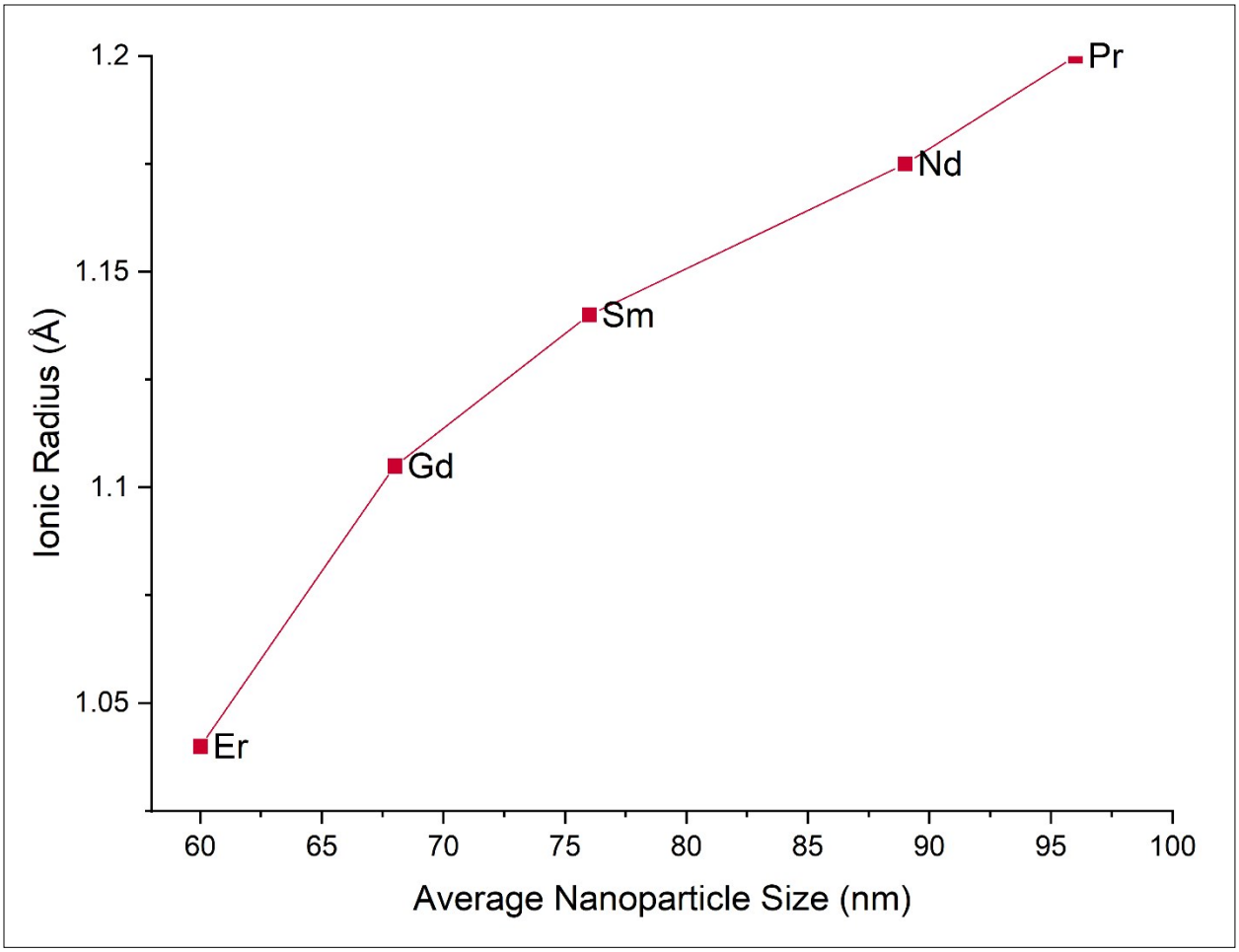

Figure S2. Plot of average nanoparticle diameter vs. lanthanide ionic radius. The decrease in diameter coincided with the contraction of Ln^{3+} ionic radius across the lanthanide series.

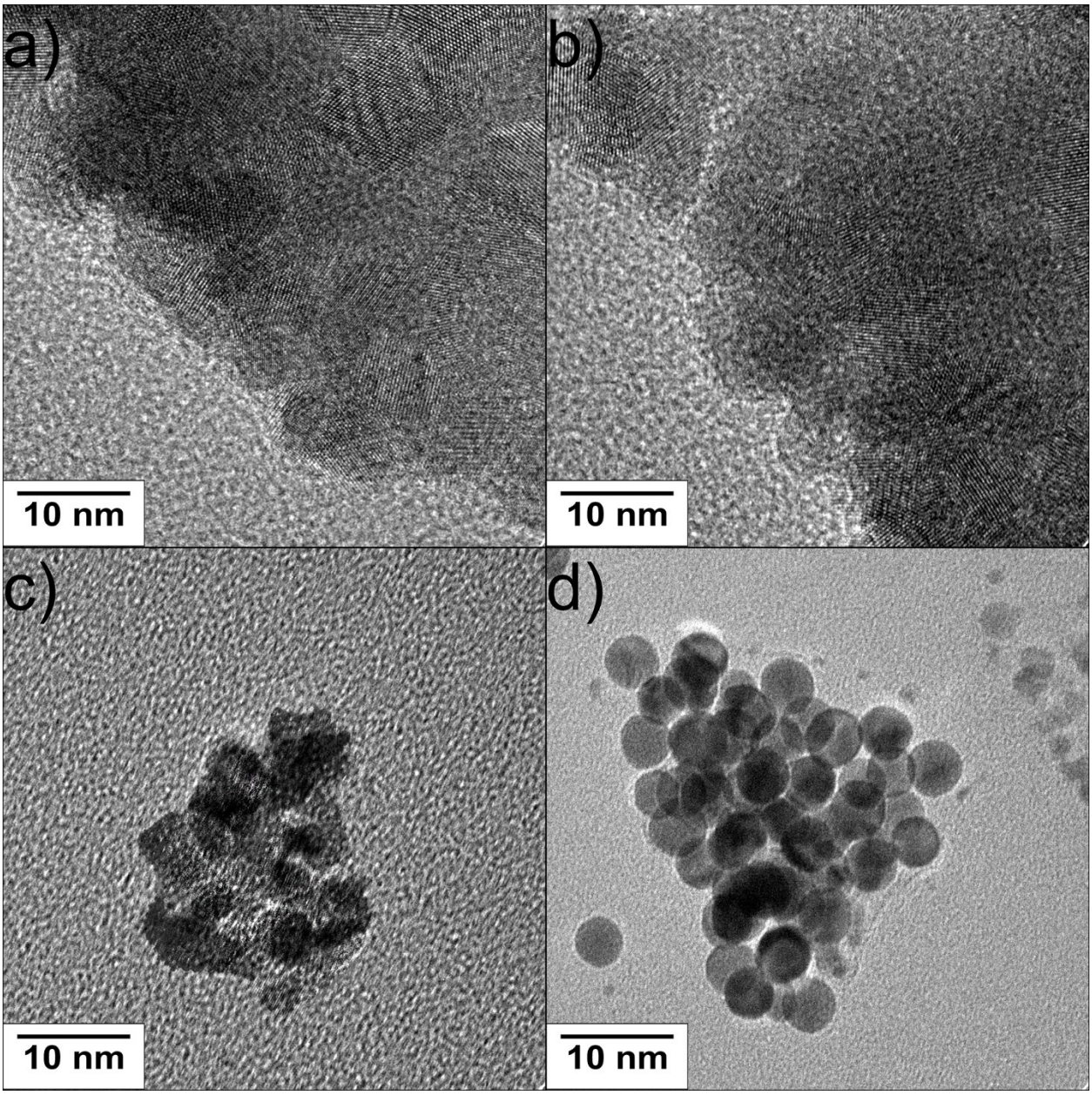

Figure S3. TEM micrographs of Ln_xO_y NPs produced by calcination of LnC_{10} NPs in air at 500 °C for 1h: (a) Pr_6O_{11}; (b) Nd_2O_3; (c) Gd_2O_3; (d) Er_2O_3.

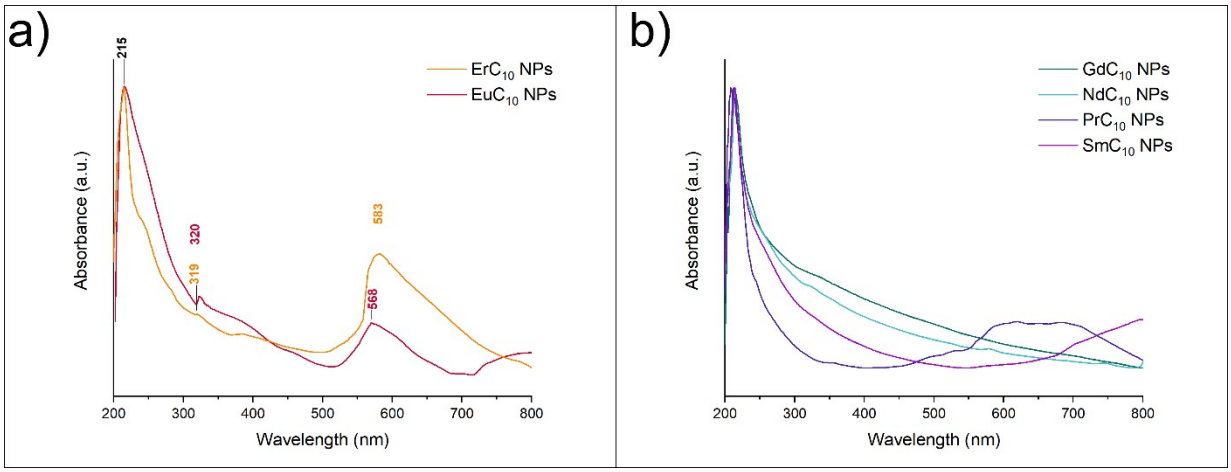

Figure S4. UV-Vis absorbance spectra of dilute methanol suspensions of LnC_{10} NPs. All spectra show absorbance maxima near 215 nm. (a) Er and EuC_{10} NPs spectra also displayed well-defined secondary absorbance maxima near 570 nm. (b) Gd, Nd, Pr, and SmC_{10} NPs did not display strong or distinct absorbance peaks at $\lambda > 230$ nm.

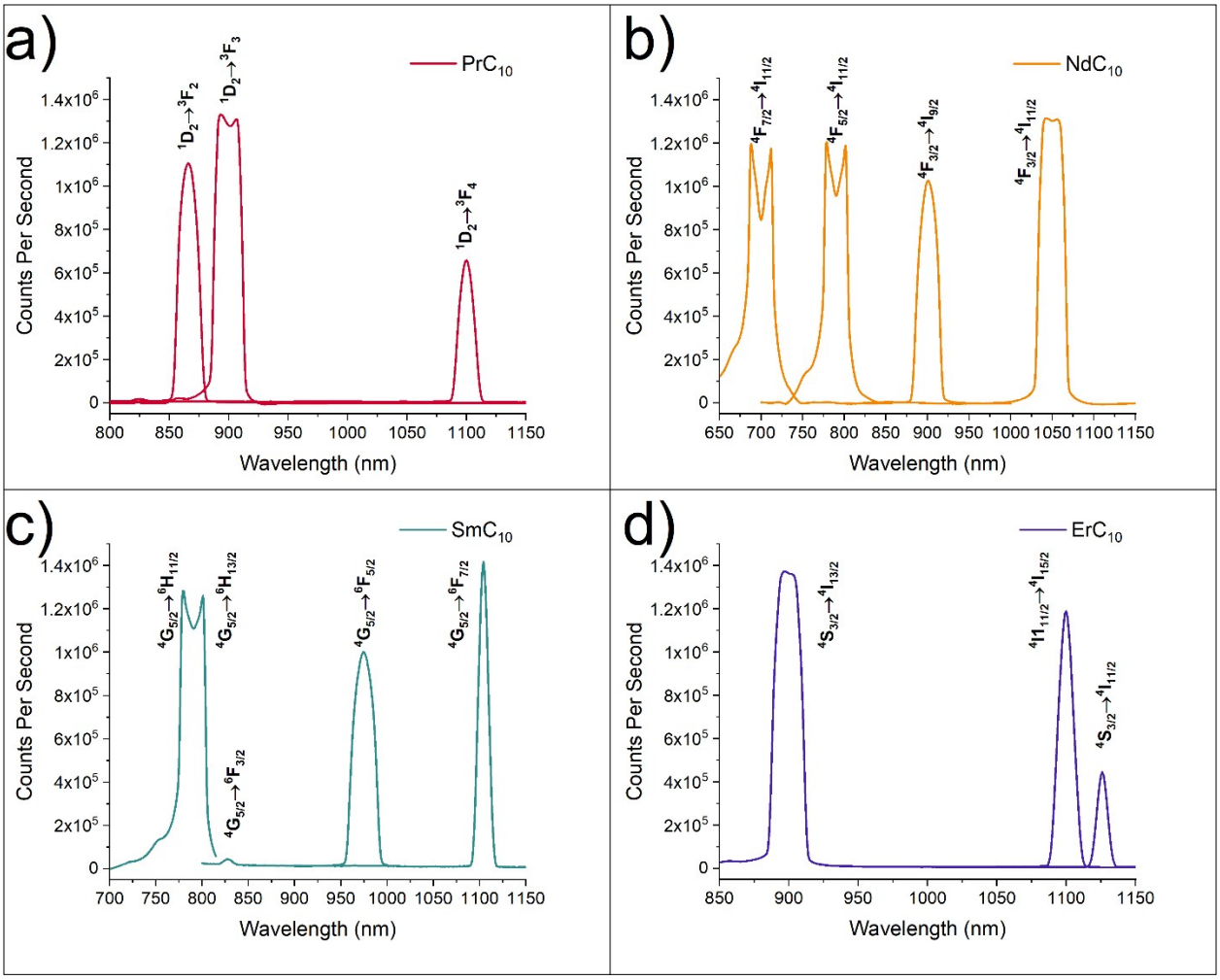

Figure S5. NIR-range photoluminescence emission spectra for (a) PrC_{10}; (b) NdC_{10}; (c) SmC_{10}; and (d) ErC_{10} NPs. Labeled peak transitions corresponded with expected wavelengths for each sample. NIR-range PL spectra were collected from 5 g/L ethanol suspensions of LnC_{10} NPs using excitation wavelengths of 450 nm (NdC_{10}) or 550 nm (Pr, Sm, ErC_{10}).

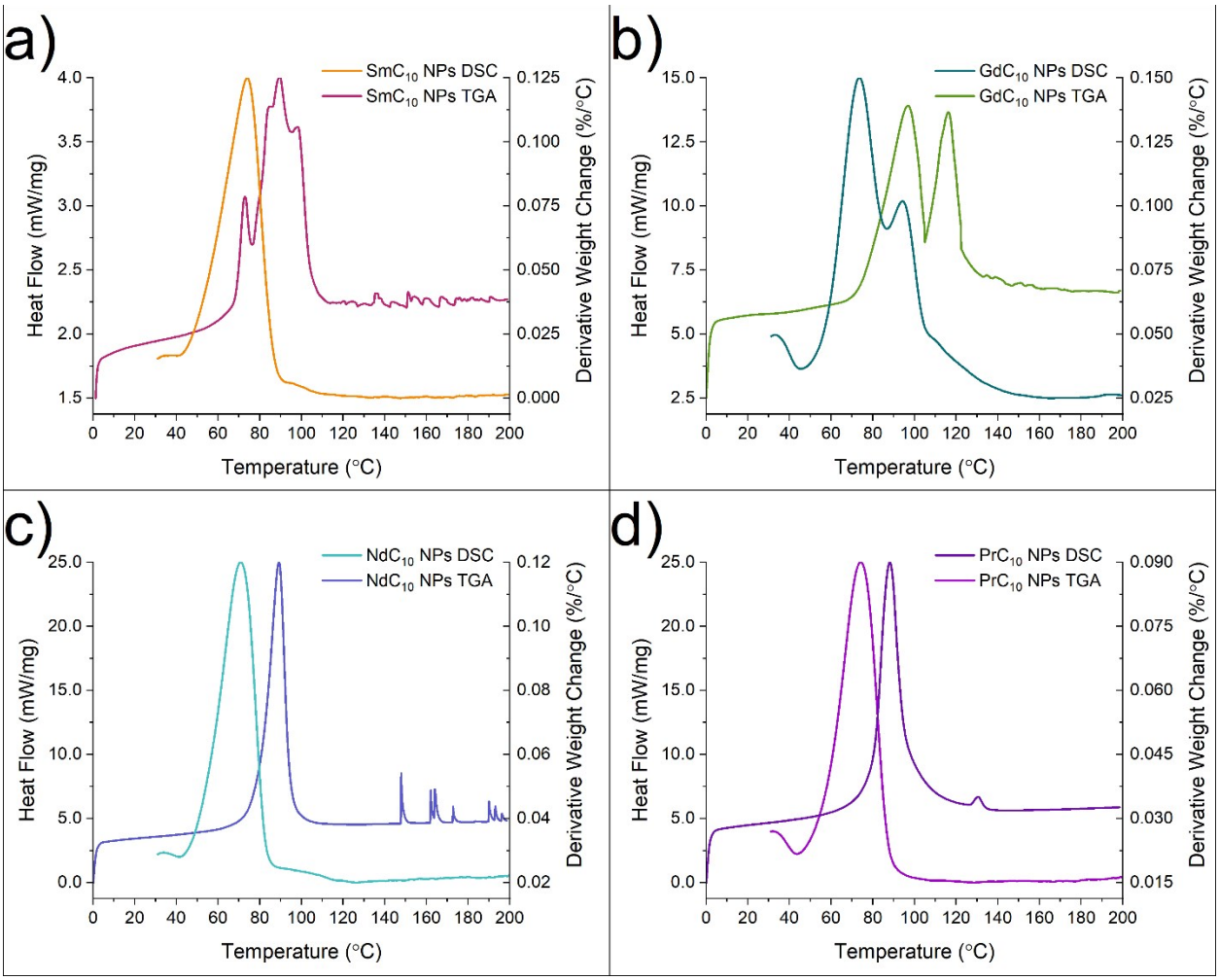

Figure S6. Comparison of DSC endothermic heat flow vs. TGA derivative weight change over the full DSC analysis range (0 – 200 °C) for (a) SmC_{10}; (b) GdC_{10}; (c) NdC_{10}; and (d) PrC_{10} NPs. Lack of overlap between the peaks of each curve indicates that heat flux events observed under DSC were not associated with weight loss from thermal decomposition.

Average Nanoparticle Diameter Before and After Calcination			
Ln^{3+}	**LnC_{10} (nm)**	**Ln_xO_y (nm)**	**Percent Reduction**
Pr	96.3	13.4	86
Nd	89.7	12.8	85
Sm	76.2	12.2	84
Gd	68.6	3.5	95
Er	60.9	3.1	95

Table S1. Summary of average nanoparticle diameter calculated from TEM analysis of as-synthesized LnC_{10} NPs and the Ln_xO_y NPs produced after calcination. The trend of decrease in particle diameter from PrC_{10} to ErC_{10} may be related to the effects of lanthanide contraction. The significant reduction after calcination supports the conversion of LnC_{10} to Ln_xO_y via combustion of surface-adsorbed and intercalated decanoate ligands.