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Supplementary Material

Preparation and Structures of Rare Earth 3-Benzoylpropanoates and 3-Phenylpropanoates

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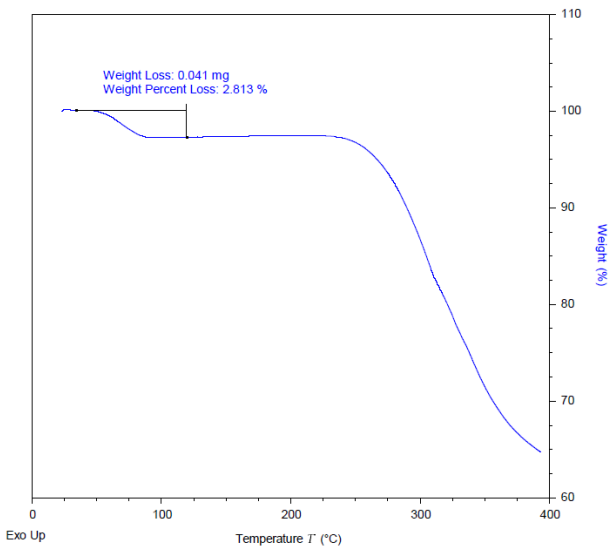

Fig. S1. TGA plot of bulk La(bp)$_3$ sampled for microanalysis.

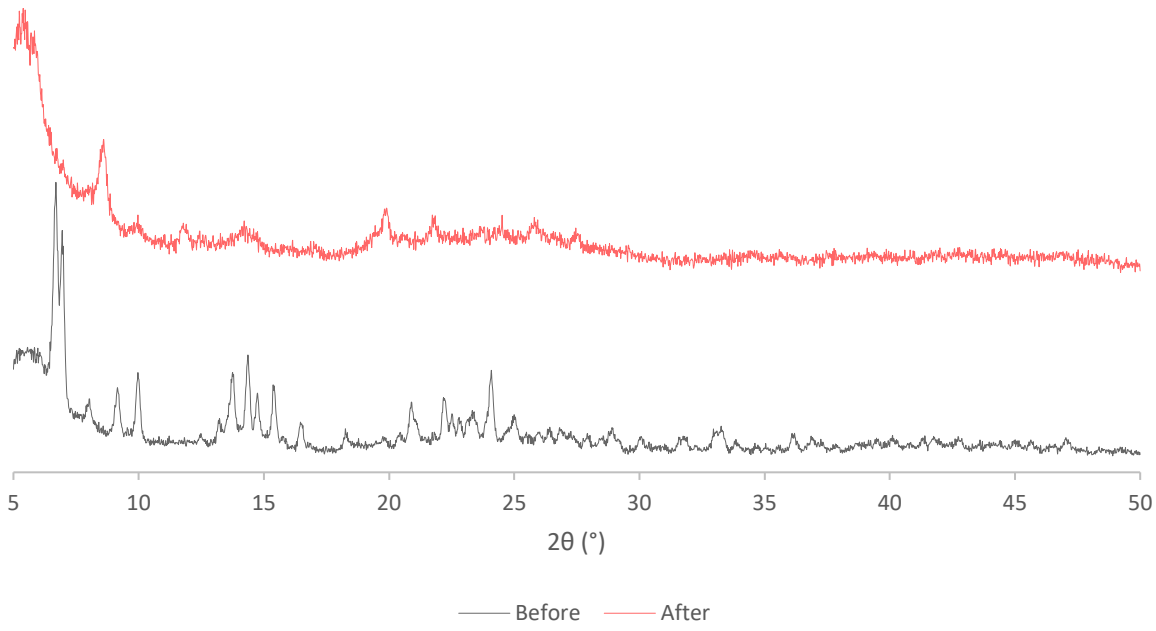

Fig. S2. Powder XRD of bulk $La(bp)_3$ before and after heating.

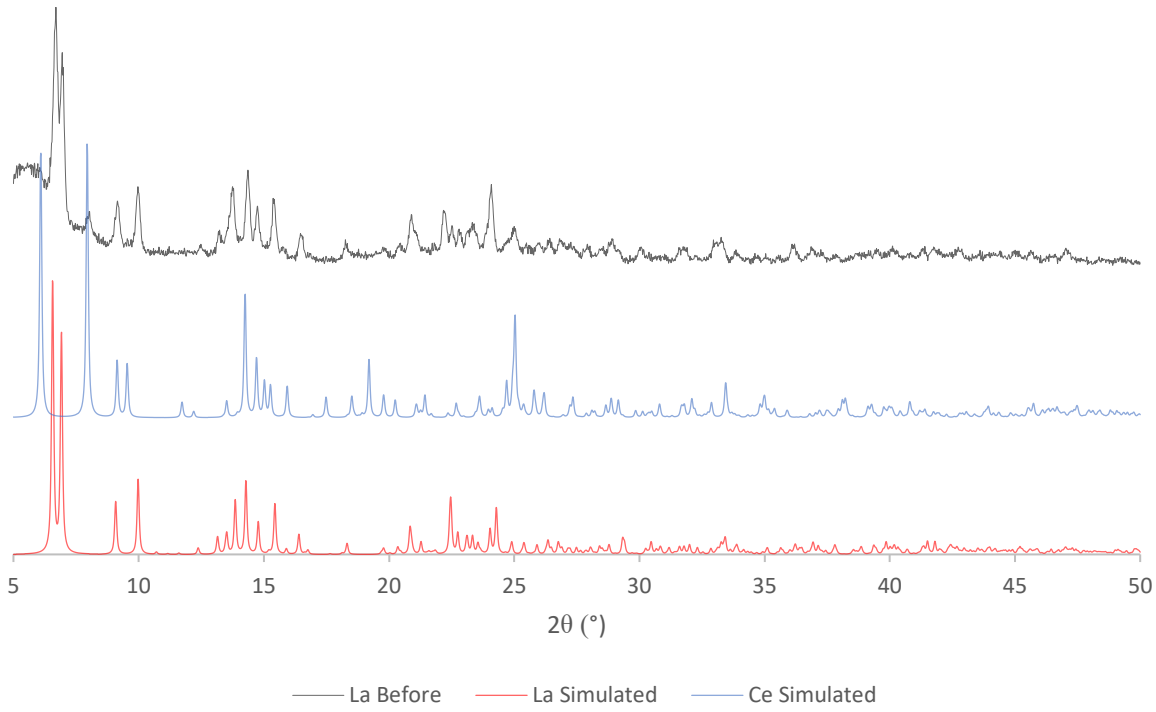

Fig. S3. Powder XRD of bulk $La(bp)_3$ before heating, simulated $[La(bp)_3(H_2O)_2]\cdot 1⅓H_2O$ and simulated $[Ce(bp)_3(H_2O)]$. Simulated patterns generated from single crystal data.

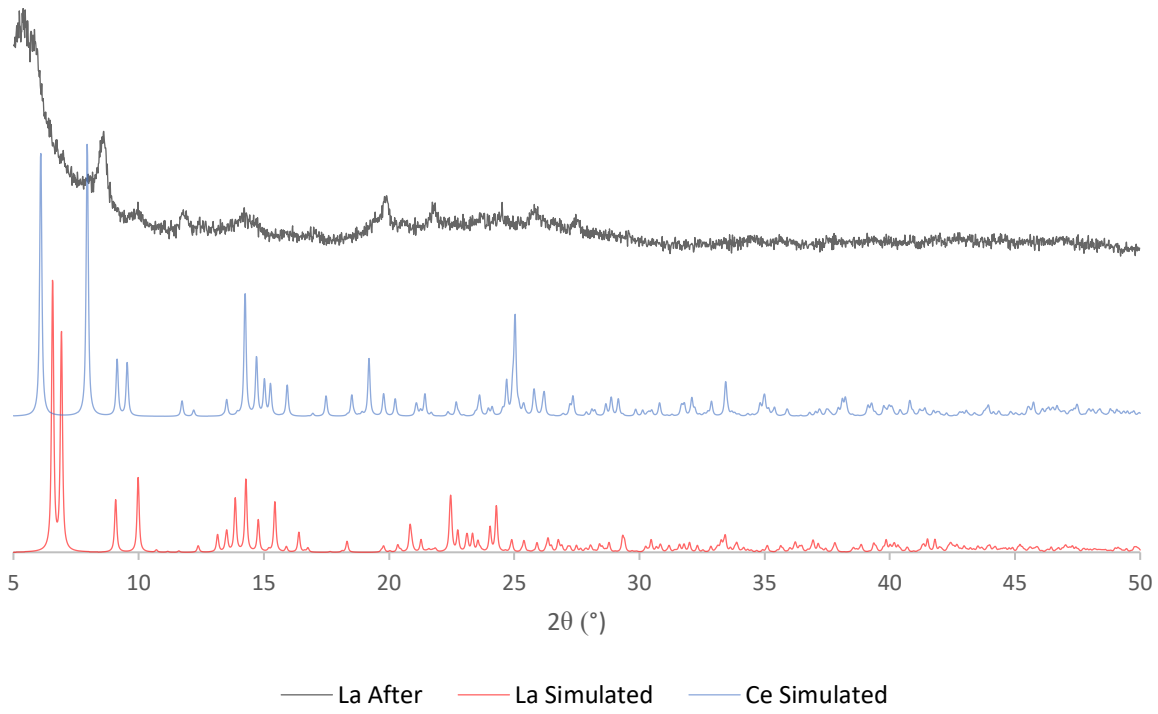

Fig. S4. Powder XRD of bulk $La(bp)_3$ after heating, simulated $[La(bp)_3(H_2O)_2]\cdot 1\frac{1}{3}H_2O$ and simulated $[Ce(bp)_3(H_2O)]$. Simulated patterns generated from single crystal data.

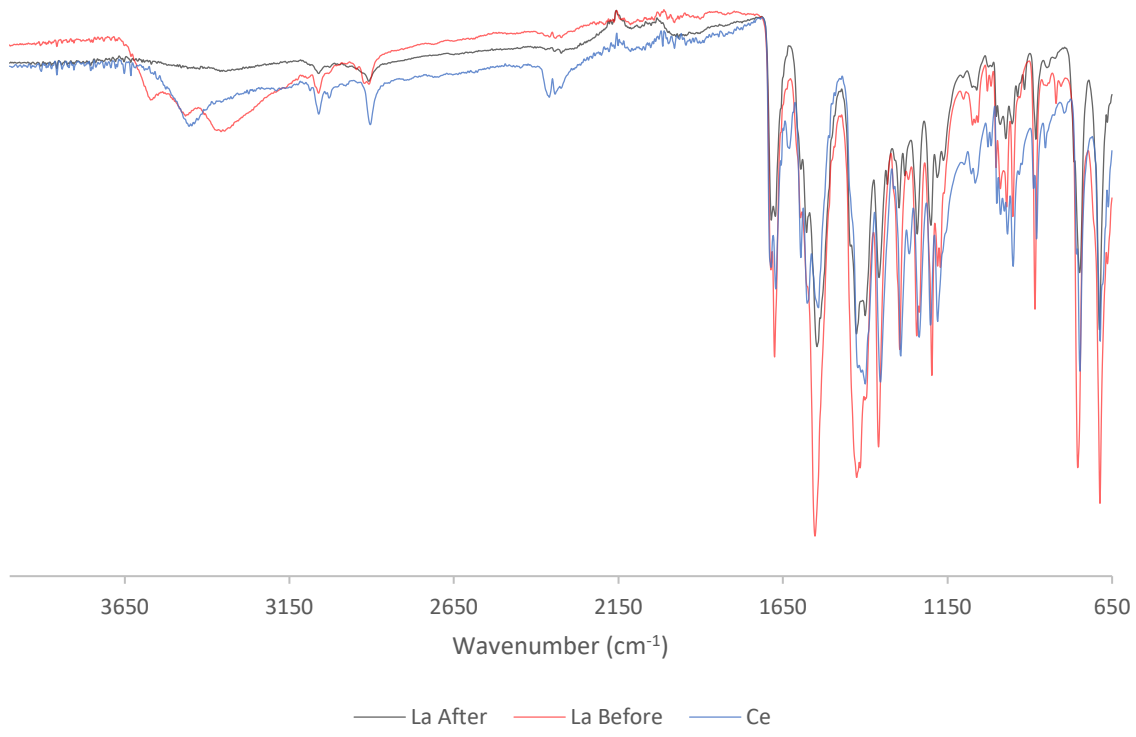

Fig. S5. ATR-IR of bulk $La(bp)_3$ before heating, after heating and $[Ce(bp)_3(H_2O)]$.

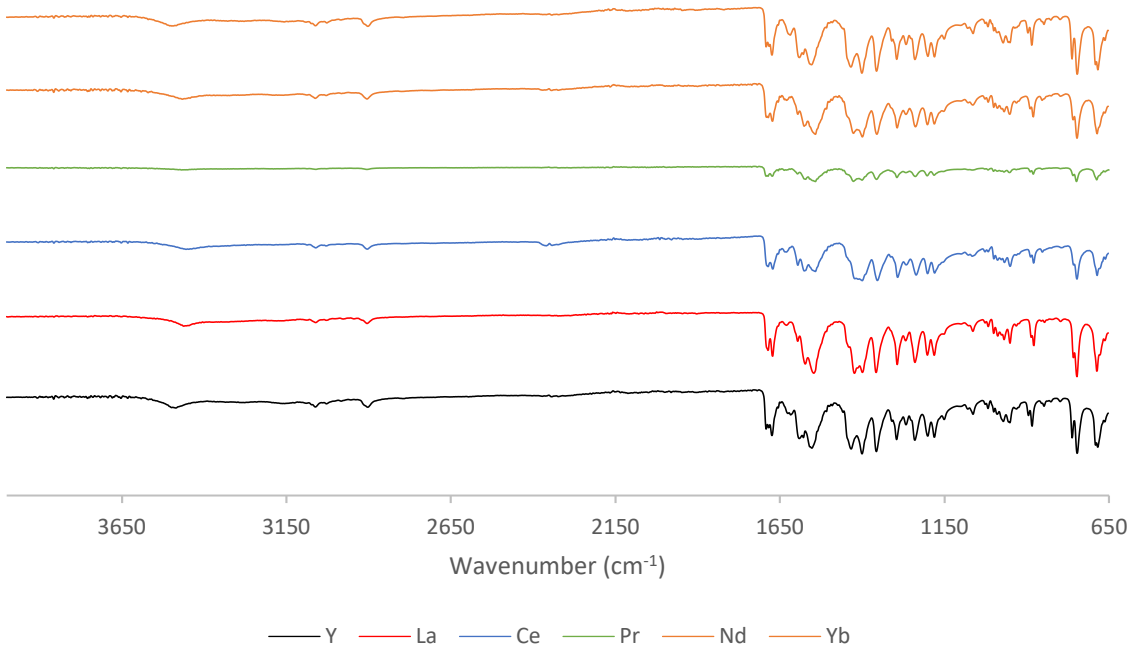

Fig. S6. ATR-IR of $[RE(bp)_3(H_2O)_n]$ complexes (RE = La, n = 2; RE = Y, Ce, Pr, Nd, Yb, n = 1).

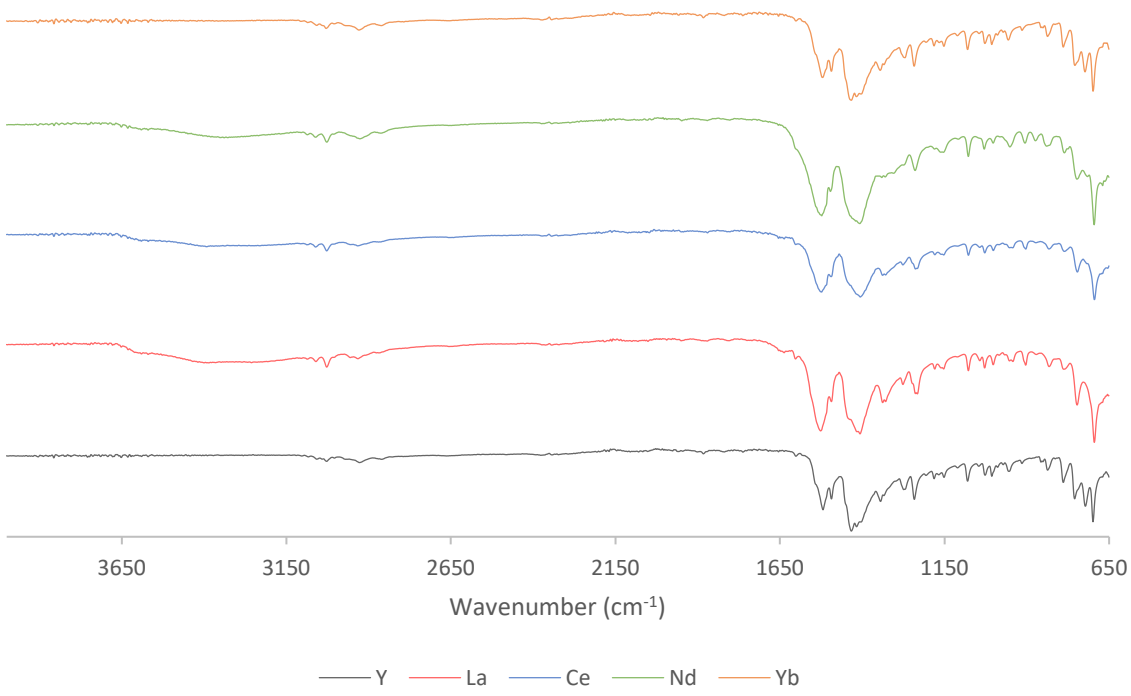

Fig. S7. ATR-IR of $[RE(pp)_3]$ (RE = Y, Yb) and $[Ln(pp)_3]\cdot nH_2O$ (Ln = La, n = 0.5; Ln = Ce, n = 1; Ln = Nd, n = 3)

$[La(mbp)_3(H_2O)_2]\cdot 3H_2O$ Crystal and Structure Refinement Data:

$C_{33}H_{43}LaO_{14}$, M 802.58, triclinic, space group $P\bar{1}$ (No. 2), *a* 8.6610(17), *b* 9.941(2) , *c* 21.902(4) Å, α 80.81(3)°, β 87.61°, γ 66.27(3)°, V 1703.6(7) $Å^3$, Z 2, λ 0.71073 Å, T 100(2) K, μ 1.322 mm^{-1}, $2\theta_{max}$ 51.364°, 24936 reflections collected, 6450 unique (R_{int} 0.1146), N_o 6062, 444 parameters, R_1 (I>2σ(I)) 0.0865, wR_2 (all data) 0.2118, GoF 1.098, $\Delta e_{min/max}$ -4.33/5.72 e· $Å^{-3}$.

Table S1. Selected bond distances (Å) for $[La(mbp)_3(H_2O)_2]\cdot 3H_2O$

Atoms	$La(mbp)_3$
M-O(1)	2.470(7)
M-O(2)[i]	2.586(7)
M-O(4)	2.462(7)
M-O(4)[i]	2.765(7)
M-O(5)[i]	2.628(7)
M-O(7)	2.535(7)
M-O(7)[ii]	2.678(7)
M-O(8)[ii]	2.624(7)
M-O(10)	2.600(7)
M-O(11)	2.655(6)

[i] Symmetry operator: 1-x,1-y,1-z

[ii] Symmetry operator: -x,1-y,1-z