# Synthetic Control to Achieve Lanthanide(III)/Pyrimidine-4,6-dicarboxylate Compounds by Preventing Oxalate Formation: Structural, Magnetic and Luminescent Properties 

Javier Cepeda, ${ }^{\ddagger} *$ Rolindes Balda, ${ }^{\S}$ Garikoitz Beobide, ${ }^{\ddagger}$ Oscar Castillo, ${ }^{\ddagger} *$ Joaquín Fernández, ${ }^{\S}$ Antonio Luque, ${ }^{\ddagger}$ Sonia Pérez-Yáñez, ${ }^{\ddagger}$ and Pascual Román ${ }^{\star}$<br>${ }^{7}$ Departamento de Quimica Inorgánica, Facultad de Ciencia y Tecnología, Universidad del País Vasco, Apartado 644, E-48080 Bilbao, Spain and ${ }^{\S}$ Departamento de Física Aplicada I, Escuela Superior de Ingenieros, Universidad del País Vasco, E-48013 Bilbao, Spain.

S2-9. Elemental analyses and FT-IR spectroscopy of compounds 1-Ln, 2-Ln, and A, B, C, and $\mathbf{D}$ compounds.

S10. FTIR spectra of compounds 1-Ln, 2-Ln, and A, B, C, and D compounds.
S11. Precession image of the $\mathbf{1 - G d}$ compound and integration of the main and satellite reflections.

S12-15. XRPD data and pattern-matching analyses for compounds 1-Ln and 2-Ln.
S16-17. XRPD data for structurally non-characterized $\mathbf{A}, \mathbf{B}, \mathbf{C}$, and $\mathbf{D}$ compounds.
S18. XRPD data for low crystallinity 2-Ln and $\mathrm{Ln} /$ pmdc/ox mixtures.
S19-20. Thermodiffractometric and thermogravimetric data for compounds 1-Ln and 2-Ln.
S21-25. Plots of the thermal dependence of the magnetic susceptibility of compounds 1-Ln-2Ln.

S26-27. Theoretical expressions derived for the fit of the magnetic susceptibility.
S28. Experimental emission decay curves for compounds 1-Nd, 2-Nd, 1-Eu, 2-Eu, 1-Tb, and 2-Tb.

Compounds 1-Ln: Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{26} \mathrm{LaN}_{3} \mathrm{O}_{14.5}$ (1-La): C, 19.75; H, 4.79; N, 7.68; La, 25.38. Found: C, 20.99; H, 4.36; N, 8.16; La, 27.02\%. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=$ 3415 (s) 3215 (sh) [v(O-H)]; 1635 (vs) [ $\left.\mathrm{v}_{\text {as }}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1605$ (sh), 1545 (s) [v (C=C $\left.+\mathrm{C}=\mathrm{N}\right)$ ]; 1470 (w), 1430 (sh) [v(C $\left.\left.\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1385$ (s), 1310 (w) [ $\left.\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1295$ (sh), 1190 (m), 1110 (w), 1025 (w), 990 (sh) [ $\left.\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 925(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 850(\mathrm{~m}), 815$ (w) [ $\left.\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 735$ (s), 725 (sh) $\left[\tau_{\text {ring }}\right] ; 695(\mathrm{~m})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 525(\mathrm{w})[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{26} \mathrm{CeN}_{3} \mathrm{O}_{14.5}(\mathbf{1 - C e}):$ C, 19.71; H, 4.78; N, 7.66; Ce, 25.55. Found: C, 21.06; H, 4.25; N, 8.10; Ce, 27.29\%. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3410$ (s) 3210 (sh) $[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1645$ (vs) $\left[\mathrm{vas}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1605$ (sh), 1545 (s) [v (C=C $+\mathrm{C}=\mathrm{N})] ; 1470(\mathrm{w}), 1430(\mathrm{sh})\left[v\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1375$ (s), $1310(\mathrm{w})\left[v_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\right.$ O)]; $1290(\mathrm{sh}), 1190(\mathrm{~m}), 1110(\mathrm{w}), 1025(\mathrm{w}), 995(\mathrm{sh})\left[\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 925(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 845(\mathrm{~m}), 815$ (w) $[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 735(\mathrm{~s}), 725(\mathrm{sh})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~m})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 520(\mathrm{w})[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{26} \mathrm{~N}_{3} \mathrm{O}_{14.5} \mathrm{Pr}$ (1-Pr): C, 19.68; H, 4.77; N, 7.65; Pr, 25.66. Found: C, 20.93; H, 4.41; N, 8.11; Pr, 27.32\%. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3415$ (s) $3215(\mathrm{sh})[\mathrm{v}(\mathrm{O}-$ $\mathrm{H})] ; 1645(\mathrm{vs})\left[\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1605(\mathrm{sh}), 1540(\mathrm{~s})[\mathrm{v}(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})] ; 1475(\mathrm{w}), 1435(\mathrm{sh})\left[\mathrm{v}\left(\mathrm{C}_{\mathrm{ar}}{ }^{-}\right.\right.$ C)]; 1380 (s), 1310 (w) [ $\left.\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1290(\mathrm{sh}), 1195(\mathrm{~m}), 1115(\mathrm{w}), 1025(\mathrm{w}), 995(\mathrm{sh})\left[\delta_{\mathrm{ip}}(\mathrm{C}-\right.$ H)]; $925(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 850(\mathrm{~m}), 815(\mathrm{w})[8(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 730(\mathrm{~s}), 725(\mathrm{sh})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~m})\left[\delta_{\mathrm{op}}(\mathrm{C}-\mathrm{H})\right]$; 520 (w) $[v(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{26} \mathrm{~N}_{3} \mathrm{NdO}_{14.5}$ (1-Nd): C, 19.56; H, 4.74; N, 7.60; Nd , 26.10. Found: C, 20.91; H, 4.33; N, 8.07; Nd, $27.95 \%$. Main IR features $\left(\mathrm{KBr}\right.$ pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3415$ (s) $3215(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1640(\mathrm{vs})\left[\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1605(\mathrm{sh}), 1545(\mathrm{~s})[\mathrm{v}(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})]$; 1475 (w), 1435 (sh) [ $\left.\mathrm{v}\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1380(\mathrm{~s}), 1310$ (w) [ $\left.\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1290(\mathrm{sh}), 1195(\mathrm{~m}), 1110(\mathrm{w})$, 1025 (w), 995 (sh) [ $\left.\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 925(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 850(\mathrm{~m}), 815(\mathrm{w})[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 730(\mathrm{~s}), 725(\mathrm{sh})$ $\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~m})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 520(\mathrm{w})[v(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{26} \mathrm{~N}_{3} \mathrm{O}_{14.5} \mathrm{Sm}(1-$ Sm): C, 19.35; H, 4.69; N, 7.52; Sm, 26.91. Found: C, 20.62; H, 4.16; N, 8.01; Sm, 28.70\%. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3415(\mathrm{~s}) 3210(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1640(\mathrm{vs})\left[\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right]$; 1605 (sh), 1545 (s) [v (C=C + C=N)]; 1475 (w), $1430(\mathrm{sh})\left[\mathrm{v}\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1380(\mathrm{~s}), 1310(\mathrm{w})\left[\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\right.$

C-O)]; 1290 (sh), 1190 (m), 1110 (w), 1025 (w), 990 (sh) [ $\left.\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 925$ (w) [ $\left.\delta_{\text {ring }}\right] ; 850(\mathrm{~m})$, $815(\mathrm{w})[8(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 735(\mathrm{~s}), 725(\mathrm{sh})\left[\tau_{\text {ring }}\right] ; 705(\mathrm{~m})\left[\delta_{\mathrm{op}}(\mathrm{C}-\mathrm{H})\right] ; 520(\mathrm{w})[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{26} \mathrm{EuN}_{3} \mathrm{O}_{14.5}$ (1-Eu): C, 19.29; H, 4.68; N, 7.50; Eu, 27.12. Found: C, 20.73; H, 4.12; N, 7.90; Eu, 28.89\%.Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3415$ (s) 3215 (sh) $[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1640(\mathrm{vs})\left[\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1605(\mathrm{sh}), 1545(\mathrm{~s})[\mathrm{v}(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})] ; 1470(\mathrm{w}), 1430(\mathrm{sh})$ [v(C $\left.\left.\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1380(\mathrm{~s}), 1315$ (w) [ $\left.\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1290(\mathrm{sh}), 1195$ (m), 1110 (w), 1020 (w), 995 (sh) $\left[\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 925(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 850(\mathrm{~m}), 815(\mathrm{w})[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 735(\mathrm{~s}), 725(\mathrm{sh})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~m})$ $\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 520(\mathrm{w})[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{28} \mathrm{GdN}_{3} \mathrm{O}_{15.5}$ (1-Gd): C, 18.52; H, 4.84; N, 7.20; Gd, 26.95. Found: C, 20.78; H, 3.20; N, 7.93; Gd, 29.95\%. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3415(\mathrm{~s}) 3215(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1640(\mathrm{vs})\left[\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1605(\mathrm{sh}), 1545(\mathrm{~s})[\mathrm{v}$ $(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})] ; 1470(\mathrm{w}), 1430(\mathrm{sh})\left[\mathrm{v}\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1380(\mathrm{~s}), 1310(\mathrm{w})\left[\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1290$ (sh), $1190(\mathrm{~m}), 1110(\mathrm{w}), 1025(\mathrm{w}), 995(\mathrm{sh})\left[\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 925(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 850(\mathrm{~m}), 815(\mathrm{w})$ [ $\delta(\mathrm{O}-\mathrm{C}-$ O)]; $735(\mathrm{~s}), 725(\mathrm{sh})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~m})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 520(\mathrm{w})[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{26} \mathrm{~N}_{3} \mathrm{O}_{14.5} \mathrm{~Tb}$ (1-Tb): C, 19.06; H, 4.62; N, 7.41; Tb, 28.02. Found: C, 20.42; H, 4.28; N, 7.83; $\mathrm{Tb}, 29.93 \%$. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3400(\mathrm{~s}), 3215(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1640$ (vs) $\left[\mathrm{v}_{\text {as }}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1605(\mathrm{sh}), 1545(\mathrm{~s})[\mathrm{v}(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})] ; 1470(\mathrm{w}), 1430(\mathrm{sh})\left[\mathrm{v}\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1380$ (s), 1315 (w) [ $\left.v_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1295$ (sh), 1190 (m), 1105 (w), 1025 (w), 1000 (sh) [ $\left.\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 915$ (w) $\left[\delta_{\text {ring }}\right] ; 850(\mathrm{~m}), 810(\mathrm{w})[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 740(\mathrm{~s}), 725(\mathrm{sh})\left[\tau_{\text {ring }}\right] ; 695(\mathrm{~m})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 525(\mathrm{w})$ $[v(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{26} \mathrm{DyN}_{3} \mathrm{O}_{14.5}$ (1-Dy): C, 18.94; H, 4.59; N, 7.36; Dy, 28.47. Found: C, 20.15; H, 4.12; N, 7.89; Dy, 30.24\%. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=$ $3400(\mathrm{~s}), 3215(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1640(\mathrm{vs})\left[\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1605(\mathrm{sh}), 1545(\mathrm{~s})[\mathrm{v}(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})]$; 1470 (w), 1430 (sh) [v(C $\left.\left.\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1385$ (s), 1310 (w) [ $\left.\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1291$ (sh), 1190 (m), 1100 (w), $1025(\mathrm{w}), 1000(\mathrm{sh})\left[\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 915(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 850(\mathrm{~m}), 815(\mathrm{w})[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 740(\mathrm{~s}), 720(\mathrm{sh})$ $\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~m})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 525(\mathrm{w})[v(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{26} \mathrm{HoN}_{3} \mathrm{O}_{14.5}(\mathbf{1 - H o}):$ C, 18.86; H, 4.57; N, 7.33; Ho, 28.77. Found: C, 20.03; H, 4.05; N, 7.69; Ho, 30.59\%. Main IR
features $\left(\mathrm{KBr}\right.$ pellets, $\left.\mathrm{cm}^{-1}\right): \mathrm{v}=3420(\mathrm{~s}), 3210(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1640(\mathrm{vs})\left[\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1600$ (sh), 1545 (s) $[\mathrm{v}(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})] ; 1465(\mathrm{w}), 1435$ (sh) $\left[v\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1380(\mathrm{~s}), 1310(\mathrm{~m})\left[\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\right.$ O)]; 1195 (m), 1125 (sh), 1105 (w), 1025 (w), $1000(\mathrm{sh})\left[\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 920(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 850(\mathrm{~m}), 810$ (w) $[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 740(\mathrm{~s}), 725(\mathrm{sh})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~m})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 525(\mathrm{w})[v(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{26} \mathrm{ErN}_{3} \mathrm{O}_{14.5}$ (1-Er): C, 18.78; H, 4.55; N, 7.30; Er, 29.06. Found: C, 20.05; H, 4.18; N, 7.85; Er, $31.08 \%$. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3400(\mathrm{~s}), 3210(\mathrm{sh})[\mathrm{v}(\mathrm{O}-$ $\mathrm{H})] ; 1640(\mathrm{vs})\left[\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1605(\mathrm{sh}), 1545(\mathrm{~s})[\mathrm{v}(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})] ; 1470(\mathrm{w}), 1425(\mathrm{sh})\left[\mathrm{v}\left(\mathrm{C}_{\mathrm{ar}}{ }^{-}\right.\right.$ C)]; $1380(\mathrm{~s}), 1315(\mathrm{w})\left[\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1290(\mathrm{sh}), 1190(\mathrm{~m}), 1110(\mathrm{w}), 1025(\mathrm{w}), 1000(\mathrm{sh})\left[\mathrm{\delta}_{\mathrm{ip}}(\mathrm{C}-\right.$ $\mathrm{H})] ; 920(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 850(\mathrm{~m}), 815(\mathrm{w})[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 745(\mathrm{~s}), 725(\mathrm{sh})\left[\tau_{\text {ring }}\right] ; 705(\mathrm{~m})\left[\delta_{\mathrm{op}}(\mathrm{C}-\mathrm{H})\right]$; 525 (w) $[v(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{26} \mathrm{~N}_{3} \mathrm{O}_{14.5}$ Tm (1-Tm): C, 18.73; H, 4.54; N, 7.28; Tm, 29.27. Found: C, 19.88; H, 4.13; N, 7.67; Tm, 31.03\%. Main IR features ( KBr pellets, $\left.\mathrm{cm}^{-1}\right): \mathrm{v}=3420(\mathrm{~s}), 3210(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1640(\mathrm{vs})\left[\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1605(\mathrm{sh}), 1545(\mathrm{~s})[\mathrm{v}(\mathrm{C}=\mathrm{C}+$ $\mathrm{C}=\mathrm{N})] ; 1470(\mathrm{w}), 1430(\mathrm{sh})\left[\mathrm{v}\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1380(\mathrm{~s}), 1310(\mathrm{w})\left[\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1290(\mathrm{sh}), 1190(\mathrm{~m})$, $1105(\mathrm{w}), 1025(\mathrm{w}), 1000(\mathrm{sh})\left[\delta_{\mathrm{ip}}(\mathrm{C}-\mathrm{H})\right] ; 920(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 850(\mathrm{~m}), 815(\mathrm{w})[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 740(\mathrm{~s})$, 725 (sh) $\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~m})\left[\delta_{\mathrm{op}}(\mathrm{C}-\mathrm{H})\right] ; 525$ (w) $[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{26} \mathrm{~N}_{3} \mathrm{O}_{14.5} \mathrm{Yb}(\mathbf{1 - Y b}): \mathrm{C}, 18.59 ; \mathrm{H}, 4.51 ; \mathrm{N}, 7.23 ; \mathrm{Yb}, 29.77$. Found: C, 19.72; H, 4.09; N, 7.78; $\mathrm{Yb}, 31.66 \%$. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3400(\mathrm{~s}), 3210(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1635$ (vs) $\left[\mathrm{vas}_{\text {as }}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1605(\mathrm{sh}), 1545(\mathrm{~s})[\mathrm{v}(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})] ; 1470(\mathrm{w}), 1435(\mathrm{sh})\left[\mathrm{v}\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1380$ (s), 1315 (w) [ $\left.v_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1290(\mathrm{sh}), 1190(\mathrm{~m}), 1105$ (w), 1030 (w), 1000 (sh) [ $\left.\mathrm{i}_{\mathrm{ip}}(\mathrm{C}-\mathrm{H})\right] ; 920$ (w) $\left[\delta_{\text {ring }}\right] ; 850(\mathrm{~m}), 815(\mathrm{w})[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 740(\mathrm{~s}), 725(\mathrm{sh})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~m})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 520(\mathrm{w})$ $[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$.

Compounds 2-Ln: Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{6} \mathrm{LaN}_{3} \mathrm{O}_{7.5}$ (2-La): C, 26.04; H, 1.46; N, 10.12; La, 33.47. Found: C, $25.92 ; \mathrm{H}, 1.60 ; \mathrm{N}, 10.05 ; \mathrm{La}, 33.53 \%$. Main IR features $\left(\mathrm{KBr}\right.$ pellets, $\left.\mathrm{cm}^{-1}\right): \mathrm{v}=$ 3370 (s), 3320 (sh) [v(O-H)]; 1685 (sh), 1665 (s), 1630 (vs) [ $\left.\mathrm{vas}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1600$ (vs), 1540 (s) $[v(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})] ; 1485(\mathrm{w}), 1465(\mathrm{sh}), 1455(\mathrm{w}), 1430(\mathrm{w})\left[\mathrm{v}\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1390(\mathrm{vs}), 1380(\mathrm{vs})$,

1360 (s), 1310 (m) [ $\left.v_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1290$ (sh), 1280 (w), 1190 (m), 1095 (w), 1085 (sh), 1025 (w), $1005(\mathrm{sh})\left[\delta_{\mathrm{ip}}(\mathrm{C}-\mathrm{H})\right] ; 930(\mathrm{w}), 920(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 855(\mathrm{w}), 840(\mathrm{w}), 815(\mathrm{sh}), 800(\mathrm{w})[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ;$ $730(\mathrm{sh}), 725(\mathrm{~s})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~s}), 620(\mathrm{w}) 575(\mathrm{w})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 525(\mathrm{~m}), 490(\mathrm{w})[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{6} \mathrm{CeN}_{3} \mathrm{O}_{7.5}$ (2-Ce): C, 25.97; H, 1.45; N, 10.09; Ce, 33.66. Found: C, 25.93; H, 1.49; N, 10.12; Ce, 33.64\%. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $v=3365(\mathrm{~s}), 3320(\mathrm{sh})$ [v(O-H)]; 1685 (sh), 1660 (s), 1630 (vs) [ $\left.\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1600$ (vs), 1535 (s) [v(C=C $\left.\left.+\mathrm{C}=\mathrm{N}\right)\right]$; 1485 (w), 1460 (sh), 1455 (w), 1425 (w) [v( $\left.\left.\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1390$ (vs), 1375 (vs), 1365 (s), 1310 (m) [ $\left.v_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1285(\mathrm{sh}), 1285(\mathrm{w}), 1190(\mathrm{~m}), 1095(\mathrm{w}), 1085(\mathrm{sh}), 1025(\mathrm{w}), 1005(\mathrm{sh})\left[\delta_{\mathrm{ip}}(\mathrm{C}-\right.$ H)]; 930 (w), 920 (w) [ $\left.\delta_{\text {ring }}\right] ; 850(\mathrm{w}), 840(\mathrm{w}), 810(\mathrm{sh}), 800(\mathrm{w})$ [ $\left.8(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 730(\mathrm{sh}), 725(\mathrm{~s})$ $\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~s}), 620(\mathrm{w}), 575(\mathrm{w})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 525(\mathrm{~m}), 490(\mathrm{w})[v(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{6} \mathrm{~N}_{3} \mathrm{O}_{7.5} \operatorname{Pr}$ (2-Pr): C, 25.92; H, 1.45; N, 10.08; Pr, 33.79. Found: C, 26.04; H, 1.53; N, 10.03; $\operatorname{Pr}, 33.84 \%$. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3370(\mathrm{~s}), 3320(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1685$ (sh), 1665 (s), 1630 (vs) [ $\left.\mathrm{v}_{\text {as }}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1600$ (vs), 1540 (s) [v (C=C + C=N)]; 1485 (w), 1465 (sh), 1455 (w), 1430 (w) [v(C $\mathrm{Car}^{-C}$ )]; 1390 (vs), 1380 (vs), 1355 (s), 1315 (m) [ $\left.\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1290$ (sh), 1280 (w), 1185 (m), 1095 (w), 1080 (sh), 1025 (w), 1005 (sh) [ $\left.\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 925$ (w), $920(\mathrm{w})$ [ $\left.\delta_{\text {ring }}\right] ; 850(\mathrm{w}), 840(\mathrm{w}), 810(\mathrm{sh}), 800(\mathrm{w})[8(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 730(\mathrm{sh}), 720(\mathrm{~s})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~s}), 620(\mathrm{w})$, $575(\mathrm{w})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 525(\mathrm{~m}), 485(\mathrm{w})[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{6} \mathrm{~N}_{3} \mathrm{NdO}_{7.5}$ (2Nd): C, 25.71; H, 1.44; N, 9.99; Nd, 34.31. Found: C, 25.76; H, 1.51; N, 9.89; Nd, 34.37\%. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3370(\mathrm{~s}), 3320(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1685(\mathrm{sh}), 1665(\mathrm{~s})$, 1630 (vs) [ $\left.\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1600(\mathrm{vs}), 1540(\mathrm{~s})[\mathrm{v}(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})] ; 1485(\mathrm{w}), 1470(\mathrm{sh}), 1455(\mathrm{w})$, 1430 (w) [v(C $\left.\left.\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1390(\mathrm{vs}), 1385(\mathrm{vs}), 1360(\mathrm{~s}), 1310(\mathrm{~m})\left[\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1290(\mathrm{sh}), 1280(\mathrm{w})$, $1190(\mathrm{~m}), 1095(\mathrm{w}), 1080(\mathrm{sh}), 1030(\mathrm{w}), 1005(\mathrm{sh})\left[\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 930(\mathrm{w}), 920(\mathrm{w})$ [ $\left.\delta_{\text {ring }}\right] ; 855(\mathrm{w})$, $835(\mathrm{w}), 810(\mathrm{sh}), 800(\mathrm{w})[8(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 730(\mathrm{sh}), 725(\mathrm{~s})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~s}), 620(\mathrm{w}), 575(\mathrm{w})\left[\delta_{\text {op }}(\mathrm{C}-\right.$ H)]; 520 (m), 490 (w) [ $\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})$ ]. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{6} \mathrm{~N}_{3} \mathrm{O}_{7.5} \mathrm{Sm}$ (2-Sm): C, 25.34; H, $1.42 ; \mathrm{N}, 9.85 ; \mathrm{Sm}, 35.25$. Found: C, $25.46 ; \mathrm{H}, 1.51 ; \mathrm{N}, 9.89 ; \mathrm{Sm}, 35.37 \%$. Main IR features ( KBr
pellets, $\left.\mathrm{cm}^{-1}\right): \mathrm{v}=3375(\mathrm{~s}), 3315(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1685(\mathrm{sh}), 1660(\mathrm{~s}), 1630(\mathrm{vs})\left[\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right]$; 1600 (vs), 1540 (s) [v (C=C + C=N)]; 1480 (w), 1470 (sh), 1455 (w), 1430 (w) [ $\left.\mathrm{v}\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1390$ (vs), 1385 (vs), 1360 (s), 1310 (m) [ $\left.v_{\text {s }}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1285$ (sh), 1280 (w), 1190 (m), 1095 (w), 1080 (sh), $1030(\mathrm{w}), 1005(\mathrm{sh})\left[\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 935(\mathrm{w}), 920(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 855(\mathrm{w}), 835(\mathrm{w}), 810(\mathrm{sh}), 800(\mathrm{w})$ [ $\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 730(\mathrm{sh}), 725(\mathrm{~s})\left[\tau_{\text {ring }}\right] ; 695(\mathrm{~s}), 620(\mathrm{w}), 575(\mathrm{w})\left[\delta_{\mathrm{op}}(\mathrm{C}-\mathrm{H})\right] ; 520(\mathrm{~m}), 495(\mathrm{w})$ $[v(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{6} \mathrm{EuN}_{3} \mathrm{O}_{7.5}$ (2-Eu): C, 25.25; H, 1.41; N, 9.81; Eu, 35.50. Found: C, 25.36; H, 1.48; N, 9.89; Eu, $35.37 \%$. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $v=3370$ (s), 3320 (sh) [v(O-H)]; 1685 (sh), 1660 (s), 1640 (vs) [ $\left.\mathrm{vas}_{\text {as }}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1600(\mathrm{vs}), 1540$ (s) [v ( $\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N}$ ) ]; 1485 (w), 1470 (sh), 1455 (w), 1425 (w) [v( $\left.\left.\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1390$ (vs), 1385 (vs), 1360 (s), 1310 (m) [ $\left.v_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1290$ (sh), 1280 (w), 1195 (m), 1090 (w), 1080 (sh), 1030 (w), 1005 (sh) $\left[\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 930(\mathrm{w}), 920(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 855(\mathrm{w}), 835(\mathrm{w}), 810(\mathrm{sh}), 805(\mathrm{w})[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 730$ (sh), $725(\mathrm{~s})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~s}), 620(\mathrm{w}), 575(\mathrm{w})\left[\mathrm{\delta}_{\mathrm{op}}(\mathrm{C}-\mathrm{H})\right] ; 525(\mathrm{~m}), 490(\mathrm{w})[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{6} \mathrm{GdN}_{3} \mathrm{O}_{7.5}$ (2-Gd): C, 24.94; H, 1.40; N, 9.70; Gd, 36.28. Found: C, 24.90; $\mathrm{H}, 1.51 ; \mathrm{N}, 9.79$; Gd, $36.37 \%$. Main IR features $\left(\mathrm{KBr}\right.$ pellets, $\left.\mathrm{cm}^{-1}\right): v=3370(\mathrm{~s}), 3320$ (sh) [v(O-H)]; $1680(\mathrm{sh}), 1660(\mathrm{~s}), 1625(\mathrm{vs})\left[\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1600(\mathrm{vs}), 1540(\mathrm{~s})[\mathrm{v}(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})]$; 1485 (w), 1465 (sh), 1455 (w), 1435 (w) [ $\left.\mathrm{v}\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1390$ (vs), 1380 (vs), 1360 (s), 1315 (m) [ $\left.\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1290(\mathrm{sh}), 1275(\mathrm{w}), 1190(\mathrm{~m}), 1095(\mathrm{w}), 1070(\mathrm{sh}), 1030(\mathrm{w}), 1005(\mathrm{sh})\left[\mathrm{\delta}_{\mathrm{ip}}(\mathrm{C}-\right.$ H)]; 930 (w), 920 (w) [ $\left.\delta_{\text {ring }}\right] ; 855$ (w), 835 (w), 810 (sh), 795 (w) [ $\left.(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 730$ (sh), $725(\mathrm{~s})$ [ $\left.\tau_{\text {ring }}\right] ; 700(\mathrm{~s}), 620(\mathrm{w}), 575(\mathrm{w})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 520(\mathrm{~m}), 495(\mathrm{w})[v(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{6} \mathrm{~N}_{3} \mathrm{O}_{7.5} \mathrm{~Tb}$ (2-Tb): C, 24.84; H, 1.39; N, 9.66; Tb, 36.53. Found: C, 24.76; H, 1.41; N, 9.79; $\mathrm{Tb}, 36.37 \%$. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3360(\mathrm{~s}), 3315(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1685(\mathrm{sh})$, 1665 (s), 1625 (vs) [ $\left.\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1600$ (vs), 1540 (s) [v (C=C $\left.+\mathrm{C}=\mathrm{N}\right)$ ]; 1485 (w), 1465 (sh), 1455 (w), 1425 (w) [v(C $\left.\left.\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1390$ (vs), 1385 (vs), 1355 ( s$), 1310$ (m) [ $\left.\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1290$ (sh), 1280 (w), 1185 (m), 1095 (w), 1080 (sh), 1030 (w), 1000 (sh) [ $\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})$ ]; 930 (w), 915 (w) [ $\left.\delta_{\text {ring }}\right] ; 855(\mathrm{w}), 835(\mathrm{w}), 810(\mathrm{sh}), 800(\mathrm{w})[8(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 730(\mathrm{sh}), 725(\mathrm{~s})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~s}), 620(\mathrm{w})$,
$575(\mathrm{w})\left[\delta_{\mathrm{op}}(\mathrm{C}-\mathrm{H})\right] ; 525(\mathrm{~m}), 490(\mathrm{w})[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{6} \mathrm{DyN}_{3} \mathrm{O}_{7.5}$ (2Dy): C, 24.64; H, 1.38; N, 9.58; Dy, 37.05. Found: C, 24.76; H, 1.31; N, 9.59; Dy, 37.07\%. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3370(\mathrm{~s}), 3320(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1680(\mathrm{sh}), 1665(\mathrm{~s}), 1625(\mathrm{vs})$ $\left[\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1605(\mathrm{vs}), 1540(\mathrm{~s})[\mathrm{v}(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})] ; 1485$ (w), 1470 (sh), 1450 (w), 1435 (w) [ $\left.v\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1390(\mathrm{vs}), 1385$ (vs), 1355 (s), 1305 (m) [ $\left.\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1295$ (sh), 1280 (w), 1185 (m), 1095 (w), 1080 (sh), 1030 (w), 1005 (sh) [ $\left.\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 930(\mathrm{w}), 920(\mathrm{w})$ [ $\left.\delta_{\text {ring }}\right] ; 855(\mathrm{w}), 835$ (w), $810(\mathrm{sh}), 800(\mathrm{w})[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 730(\mathrm{sh}), 725(\mathrm{~s})\left[\tau_{\text {ring }}\right] ; 695(\mathrm{~s}), 620(\mathrm{w}), 575(\mathrm{w})\left[\delta_{\mathrm{op}}(\mathrm{C}-\mathrm{H})\right] ;$ $520(\mathrm{~m}), 490(\mathrm{w})[v(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{6} \mathrm{HoN}_{3} \mathrm{O}_{7.5}$ (2-Ho): C, 24.51; H, 1.37; N, 9.53; Ho, 37.39. Found: C, 24.46; H, 1.34; N, 9.58; Ho, 37.40\%. Main IR features ( KBr pellets, $\left.\mathrm{cm}^{-1}\right): \mathrm{v}=3370(\mathrm{~s}), 3320(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1680(\mathrm{sh}), 1665(\mathrm{~s}), 1630(\mathrm{vs})\left[\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right]$; 1600 (vs), 1540 (s) [v (C=C + C=N)]; 1485 (w), 1470 (sh), 1450 (w), 1425 (w) [v( $\left.\left.\mathrm{C}_{\text {ar }}-\mathrm{C}\right)\right] ; 1390$ (vs), 1385 (vs), 1360 (s), 1310 (m) [ $\left.v_{s}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1285$ (sh), 1280 (w), 1190 (m), 1095 (w), 1080 (sh), 1035 (w), 1005 (sh) [ $\left.\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 930(\mathrm{w}), 920(\mathrm{w})$ [ $\left.\delta_{\text {ring }}\right] ; 855(\mathrm{w}), 835(\mathrm{w}), 810(\mathrm{sh}), 800(\mathrm{w})$ $[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 730(\mathrm{sh}), 720(\mathrm{~s})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~s}), 615(\mathrm{w}), 575(\mathrm{w})\left[\delta_{\mathrm{op}}(\mathrm{C}-\mathrm{H})\right] ; 520(\mathrm{~m}), 490(\mathrm{w})$ $[v(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{6} \mathrm{ErN}_{3} \mathrm{O}_{7.5}$ (2-Er): C, 24.38; H, 1.36; N, 9.48; Er, 37.72. Found: C, 24.36; H, 1.32; N, 9.59; Er, 37.69\%. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3370$ (s), 3320 (sh) [v(O-H)]; 1685 (sh), 1665 (s), 1635 (vs) [ $\left.\mathrm{vas}_{\text {as }}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1610$ (vs), 1540 (s) [v $(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})] ; 1485$ (w), 1465 (sh), 1455 (w), 1430 (w) [v( $\left.\left.\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1390$ (vs), 1380 (vs), 1355 (s), 1310 (m) [ $\left.v_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1295$ (sh), 1280 (w), 1190 (m), 1090 (w), 1080 (sh), 1025 (w), 1005 (sh) $\left[\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 935(\mathrm{w}), 920(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 855(\mathrm{w}), 835(\mathrm{w}), 810(\mathrm{sh}), 800(\mathrm{w})[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 730$ (sh), $725(\mathrm{~s})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~s}), 620(\mathrm{w}), 575(\mathrm{w})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 520(\mathrm{~m}), 490(\mathrm{w})[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{6} \mathrm{~N}_{3} \mathrm{O}_{7.5}$ Tm (2-Tm): C, 24.29; H, 1.36; N, 9.44; Tm, 37.95. Found: C, 24.35; H, 1.39; N, 9.39; Tm, 37.90\%. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3370(\mathrm{~s}), 3320$ (sh) [v(O-H)]; 1685 (sh), 1660 (s), 1630 (vs) [vas $(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 1600$ (vs), 1540 (s) [v (C=C + $\mathrm{C}=\mathrm{N})$ ]; 1485 (w), 1465 (sh), 1455 (w), 1430 (w) [v( $\left.\left.\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1390$ (vs), 1380 (vs), 1360 (s), 1315
(m) $\left[\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1290$ (sh), 1280 (w), 1195 (m), 1095 (w), 1080 (sh), 1025 (w), 1005 (sh) [ $\left.\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 930(\mathrm{w}), 920(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 855(\mathrm{w}), 835(\mathrm{w}), 810(\mathrm{sh}), 800(\mathrm{w})[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 730(\mathrm{sh})$, $725(\mathrm{~s})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~s}), 620(\mathrm{w}), 575(\mathrm{w})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 520(\mathrm{~m}), 490(\mathrm{w})[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$. Anal. Calcd for $\mathrm{C}_{9} \mathrm{H}_{6} \mathrm{~N}_{3} \mathrm{O}_{7.5} \mathrm{Yb}$ (2-Yb): C, 24.06; H, 1.35; N, 9.35; Yb, 38.52. Found: C, 23.96; H, $1.30 ; \mathrm{N}, 9.42 ; \mathrm{Yb}, 38.59 \%$. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3370(\mathrm{~s}), 3320(\mathrm{sh})[\mathrm{v}(\mathrm{O}-$ H)]; 1685 (sh), 1665 (s), 1630 (vs) [ $\left.\mathrm{v}_{\text {as }}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1600$ (vs), 1540 (s) [v (C=C $\left.\left.+\mathrm{C}=\mathrm{N}\right)\right] ; 1485$ (w), 1470 (sh), 1455 (w), 1430 (w) [v(C $\left.\left.\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1390$ (vs), 1385 (vs), 1360 (s), 1310 (m) [vs(O-C-O)]; 1290 (sh), 1280 (w), 1190 (m), 1090 (w), 1085 (sh), 1030 (w), 1005 (sh) [ $\left.\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 925$ (w), $915(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 855(\mathrm{w}), 835(\mathrm{w}), 815(\mathrm{sh}), 800(\mathrm{w})[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 730(\mathrm{sh}), 725(\mathrm{~s})\left[\tau_{\text {ring }}\right] ; 700$ (s), $620(\mathrm{w}), 575(\mathrm{w})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 520(\mathrm{~m}), 485(\mathrm{w})[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$.

Compounds A-La, $\left[\mathbf{L a}(\mathbf{p m d c})_{1.5}\left(\mathbf{H}_{\mathbf{2}} \mathbf{O}\right)\right] \cdot \mathbf{x H}_{\mathbf{2}} \mathbf{O}$ : Anal. Exp.: C, 23.8; H, 1.84; N, 9.65; La, $31.23 \%$. Main IR features $\left(\mathrm{KBr}\right.$ pellets, $\left.\mathrm{cm}^{-1}\right): v=3365(\mathrm{~s}), 3310(\mathrm{sh})[v(\mathrm{O}-\mathrm{H})] ; 1710(\mathrm{sh}), 1670$ (sh), 1640 (sh), 1630 (vs) [ $\left.\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1595$ (vs), 1540 (s) [v (C=C + C=N)]; 1485 (m), 1475 (sh), 1455 (m), 1435 (m) [ $\left.\mathrm{v}\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1380$ (vs) [ $\left.\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1310$ (s), 1290 (sh), 1205 (sh), $1190(\mathrm{~m}), 1105(\mathrm{w}), 1075(\mathrm{w}), 1015(\mathrm{w}), 1005(\mathrm{w})$ [ $\left.\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 920(\mathrm{w}), 915(\mathrm{sh})\left[\delta_{\text {ring }}\right] ; 850(\mathrm{w})$, $840(\mathrm{w}), 810(\mathrm{sh})[8(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 730(\mathrm{~m}), 700(\mathrm{~m})\left[\tau_{\text {ring }}\right] ; 670(\mathrm{w}), 620(\mathrm{~m}), 575(\mathrm{sh}), 545(\mathrm{w})$ [ $\left.\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 500(\mathrm{~m}), 495(\mathrm{sh}), 470(\mathrm{w})[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$.

Compounds B-Sm, $\left[\mathbf{S m}(\mathbf{p m d c})_{1.5}\left(\mathbf{H}_{2} \mathbf{O}\right)_{\mathbf{2}}\right] \cdot \mathbf{x H}_{\mathbf{2}} \mathbf{O}$ : Anal. Exp.: C, 22.84; H, 2.02; N, 9.05; Sm, $32.24 \%$. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3380(\mathrm{~s})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1675(\mathrm{sh}), 1640$ (vs) [ $\left.\mathrm{vas}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1590(\mathrm{sh}), 1540(\mathrm{vs})[\mathrm{v}(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})] ; 1480(\mathrm{w}), 1460(\mathrm{~m}), 1445(\mathrm{~m}), 1435$ (sh) [v( $\left.\left.\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 13900(\mathrm{vs}), 1375(\mathrm{vs})\left[\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1310(\mathrm{~m}), 1290(\mathrm{sh}), 1200(\mathrm{sh}), 1185(\mathrm{~m}), 1110$ (sh), $1100(\mathrm{~m}), 1020(\mathrm{w})\left[\delta_{\mathrm{ip}}(\mathrm{C}-\mathrm{H})\right] ; 930(\mathrm{w}), 915(\mathrm{sh})\left[\delta_{\text {ring }}\right] ; 850(\mathrm{~m}), 810(\mathrm{~m})[\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 780$ (w), $740(\mathrm{vs}), 720(\mathrm{~s}), 700(\mathrm{~s})\left[\tau_{\text {ring }}\right] ; 595(\mathrm{w}), 580(\mathrm{sh}), 520(\mathrm{~m})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 485(\mathrm{w}), 440(\mathrm{w})$, 415 (w) $[v(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$.

Compound C-Dy, $\left[\mathbf{D y}(\mathbf{p m d c})_{1.5}\left(\mathbf{H}_{2} \mathbf{O}\right)_{\mathbf{2}}\right] \cdot \mathbf{x H}_{\mathbf{2}} \mathbf{O}$ : Anal. Exp.: C, 21.32; H, 2.88; N, 8.58; Dy, $32.47 \%$. Main IR features (KBr pellets, $\left.\mathrm{cm}^{-1}\right): v=3390(\mathrm{~s}), 3345(\mathrm{sh})[v(\mathrm{O}-\mathrm{H})] ; 1680(\mathrm{sh}), 1635$ (vs), [ $\left.\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1610(\mathrm{sh}), 1595(\mathrm{vs}), 1540$ (s) $[\mathrm{v}(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})] ; 1450(\mathrm{~m}),\left[\mathrm{v}\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1395$ (sh), 1385 (vs), 1365 (sh), 1315 (m) [ $\left.\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1285$ (sh), 1210 (w), 1195 (m), 1100 (w), $1025(\mathrm{w}), 1000(\mathrm{w}), 995(\mathrm{sh})\left[\delta_{\text {ip }}(\mathrm{C}-\mathrm{H})\right] ; 925(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 845(\mathrm{w}), 805(\mathrm{sh}), 800(\mathrm{~s}), 780(\mathrm{sh})$ [ $\delta(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 760(\mathrm{w}), 735(\mathrm{~m}), 725(\mathrm{sh})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~m}), 645(\mathrm{sh}), 600(\mathrm{w}), 560(\mathrm{w})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ;$ 545 (w), 480 (sh), 445 (w) [v(M-O + M-N)].

Compound D-Yb, $\left[\mathbf{Y b}(\mathbf{p m d c})_{1.5}\left(\mathbf{H}_{\mathbf{2}} \mathbf{O}\right)_{2.5}\right] \cdot \mathbf{x H}_{\mathbf{2}} \mathbf{O}$ : Anal. Exp.: C, 21.60 ; H, 2.34; N, 8.29 ; Yb, $34.33 \%$. Main IR features ( KBr pellets, $\mathrm{cm}^{-1}$ ): $\mathrm{v}=3400(\mathrm{~s}), 3240(\mathrm{sh})[\mathrm{v}(\mathrm{O}-\mathrm{H})] ; 1660(\mathrm{vs}), 1635$ (sh) $\left[\mathrm{v}_{\mathrm{as}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1600(\mathrm{sh}), 1545$ (s) $[\mathrm{v}(\mathrm{C}=\mathrm{C}+\mathrm{C}=\mathrm{N})] ; 1470(\mathrm{sh}), 1455(\mathrm{w})\left[\mathrm{v}\left(\mathrm{C}_{\mathrm{ar}}-\mathrm{C}\right)\right] ; 1395$ (s), 1380 (vs), 1365 (sh) [ $\left.\mathrm{v}_{\mathrm{s}}(\mathrm{O}-\mathrm{C}-\mathrm{O})\right] ; 1305$ (w), 1190 (m), 1100 (w), 1030 (w), 1015 (w) [ $\delta_{\text {ip }}(\mathrm{C}-$ H)]; 935 (w), $920(\mathrm{w})\left[\delta_{\text {ring }}\right] ; 895(\mathrm{w}), 850(\mathrm{sh}), 840(\mathrm{w}), 810(\mathrm{w}), 800(\mathrm{sh})[8(\mathrm{O}-\mathrm{C}-\mathrm{O})] ; 740(\mathrm{sh})$, $730(\mathrm{~s}), 715(\mathrm{sh})\left[\tau_{\text {ring }}\right] ; 700(\mathrm{~m}), 670(\mathrm{w})\left[\delta_{\text {op }}(\mathrm{C}-\mathrm{H})\right] ; 545(\mathrm{w}), 485(\mathrm{w})[\mathrm{v}(\mathrm{M}-\mathrm{O}+\mathrm{M}-\mathrm{N})]$.

The crystallization water molecules cannot be reliably estimated since they are lost from room temperature, so that the samples probably only possess a partial content.


Figure S1. FTIR spectra of compounds 1-Ln, 2-Ln, and A, B, C, and D compounds.


Figure S2. Precession image of the reciprocal space along the h 01 plane at 100 K of compound 1-Gd.


Figure S3. (a) Indexation of the main (deep blue) and satellite (light blue) reflections with the untwined cell for compound $\mathbf{1 - G d}$. (b) Strength of the reflections along the reciprocal lattice axes.


Figure S4. Comparison between the experimental XRPD of compounds 1-Ln and the simulated of the compound $\mathbf{1 - S m}$ including pattern-matching refinements.


Figure S5. Comparison between the experimental XRPD of compounds 2-Ln and the simulated of the compound $\mathbf{2 - C e}$ including pattern-matching refinements.


Figure S5. Comparison between the experimental XRPD of compounds 2-Ln and the simulated of the compound $\mathbf{2 - C e}$ including pattern-matching refinements (cont.).


Figure S5. Comparison between the experimental XRPD of compounds 2-Ln and the simulated of the compound $\mathbf{2 - C e}$ including pattern-matching refinements (cont.).


Figure S6. Experimental XRPD of compound A-La.


Figure S7. Experimental XRPD of compound B-Sm.


Figure S8. Experimental XRPD of compound C-Dy.


Figure S9. Experimental XRPD of compound D-Yb.


Figure S10. XRPD of low crystallinity 2-La compound ( $\bullet$ ) mixed with a La/pmdc/ox compound (3-La).


Figure S11. XRPD of low crystallinity 2-Nd ( $\bullet$ ) compound mixed with a Nd/pmdc/ox phase (5Nd ).


Figure S12. XRPD showing the mixture of compounds of the $\mathrm{Gd} / \mathrm{pmdc} /$ ox system: 3-Gd ( $\times$ ) and 4-Gd ( $\bullet$ ).


Figure S13. Variable-temperature powder diffraction data for compound 1-Eu.


Figure S14. Variable-temperature powder diffraction data for compound 2-Pr.


Figure S15. Thermogravimetric measurements of all compounds.


Figure S16. Plots of the thermal dependence of the magnetic susceptibility of the compounds 1Ln. (o) and the best theoretical fit ( - ).


Figure S16. Plots of the thermal dependence of the magnetic susceptibility of the compounds 1Ln. (o) and the best theoretical fit (-) (cont.).


Figure S17. Plots of the thermal dependence of the magnetic susceptibility of the compounds 2Ln. (o) and the best theoretical fit ( - ).


Figure S17. Plots of the thermal dependence of the magnetic susceptibility of the compounds 2Ln. (o) and the best theoretical fit (-) (cont.).


Figure S18. Temperature dependence of $\chi_{M}{ }^{-1}$ compounds 1-Gd and 2-Gd.

$$
\left.\begin{array}{c}
\chi_{C e}=\frac{N g^{2} \beta^{2}}{k T} \frac{50 / 4 e^{-25 \Delta / 4 k T}+18 / 4 e^{-9 \Delta / 4 k T}+1 / 2 e^{-\Delta / 4 k T}}{2 e^{-25 / / 4 k T}+2 e^{-9 \Delta / 4 k T}+2 e^{-\Delta / 4 k T}} \\
\chi_{\mathrm{Pr}}=\frac{N g^{2} \beta^{2}}{k T} \frac{2 e^{-\Delta / k T}+8 e^{-4 \Delta / k T}+18 e^{-9 \Delta / k T}+32 e^{-16 \Delta / k T}}{1+2 e^{-\Delta / k T}+2 e^{-4 \Delta / k T}+2 e^{-9 \Delta / k T}+2 e^{-16 \Delta / k T}} \\
\chi_{N d}=\frac{N g^{2} \beta^{2}}{4 k T} \frac{81 e^{-81 \Delta / 4 / k T}+49 e^{-49 \Delta / 4 k T}+25 e^{-25 \Delta / 4 k T}+9 e^{-9 \Delta / 4 k T}+e^{-9 \Delta / 4 k T}}{e^{-81 \Delta / 4 k T}+e^{-49 \Delta / 4 k T}+e^{-25 \Delta / 4 k T}+e^{-9 \Delta / 4 k T}+e^{-9 \Delta / 4 k T}} \\
\chi_{S m}=\frac{N \beta^{2}}{3 k T x}\left(\frac{2.143 x+7.347+(42.92 x+1.641) e^{-7 x / 2}+(283.7 x-0.6571) e^{-8 x}}{3+4 e^{-7 x / 2}+5 e^{-8 x}+6 e^{-27 x / 2}+7 e^{-20 x}+8 e^{-55 x / 2}}\right. \\
\left.+\frac{(620.6 x-1.94) e^{-27 x / 2}+(1122 x-2.835) e^{-20 x}+(1813 x-3.556) e^{-55 x / 2}}{3+4 e^{-7 x / 2}+5 e^{-8 x}+6 e^{-27 x / 2}+7 e^{-20 x}+8 e^{-55 x / 2}}\right) \\
1+3 e^{-x}+5 e^{-3 x}+7 e^{-6 x}+9 e^{-10 x}+11 e^{-15 x}+13 e^{-21 x}
\end{array}\right)
$$

$$
\chi_{Y b}=\frac{N g^{2} \beta^{2}}{k T}\left(\frac{0.5 e^{-0.25 \Delta / k T}+1.5 e^{-0.75 \Delta / k T}+2.5 e^{-1.125 \Delta / k T}+3.5 e^{-1.75 \Delta / k T}}{2 e^{-0.25 \Delta / k T}+2 e^{-0.75 \Delta / k T}+2 e^{-1.125 \Delta / k T}+2 e^{-1.75 \Delta / k T}}\right)
$$

Scheme S1. Mathematical expressions describing the temperature dependence of the magnetic susceptibility due to the depopulation of the excited Stark levels.


Figure S19. Experimental emission decay curves of levels: ${ }^{4} \mathrm{~F}_{3 / 2}$ for $\mathrm{Nd},{ }^{5} \mathrm{D}_{0}$ for Eu , and ${ }^{5} \mathrm{D}_{4}$ for Tb compounds. The inset show the same decay in a semi-logarithmic plot.

