Electronic Supporting Information

Heat-induced transformation of luminescent, size tuneable, anisotropic Eu:Lu(OH)$_2$Cl microparticles to micro-structurally-controlled Eu:Lu$_2$O$_3$ microplatelets

Madeleine Fellner, Alberto Soppelsa and Alessandro Lauria *

Laboratory for Multifunctional Materials, Department of Materials, ETH Zürich, Vladmir-Prelog-Weg 5, 8093 Zürich, Switzerland, madeleine.fellner@mat.ethz.ch
* alessandro.lauria@mat.ethz.ch

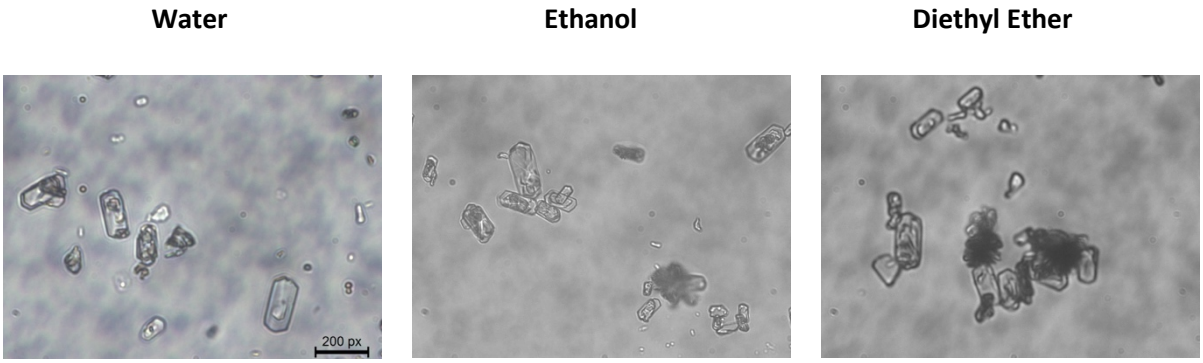

Figure S1: Eu:Lu(OH)$_2$Cl particles dispersed in different solvents, no dissolution was observed.

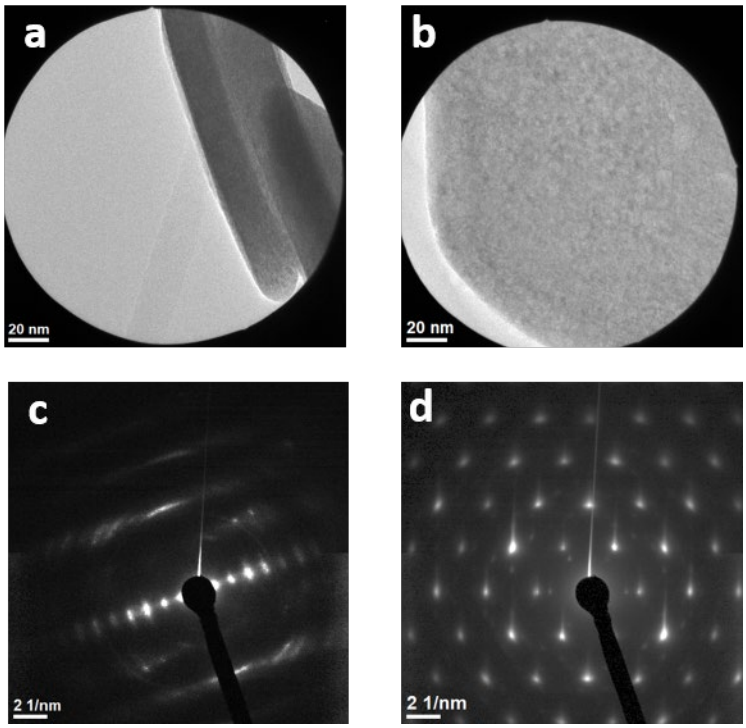

Figure S2: Lamellar platelet structure from different angles. a): Side view of Eu:$Lu(OH)_2Cl$ platelet. b): Top view of Eu:$Lu(OH)_2Cl$ platelet. c), d) ED diffraction on a) and b), respectively.

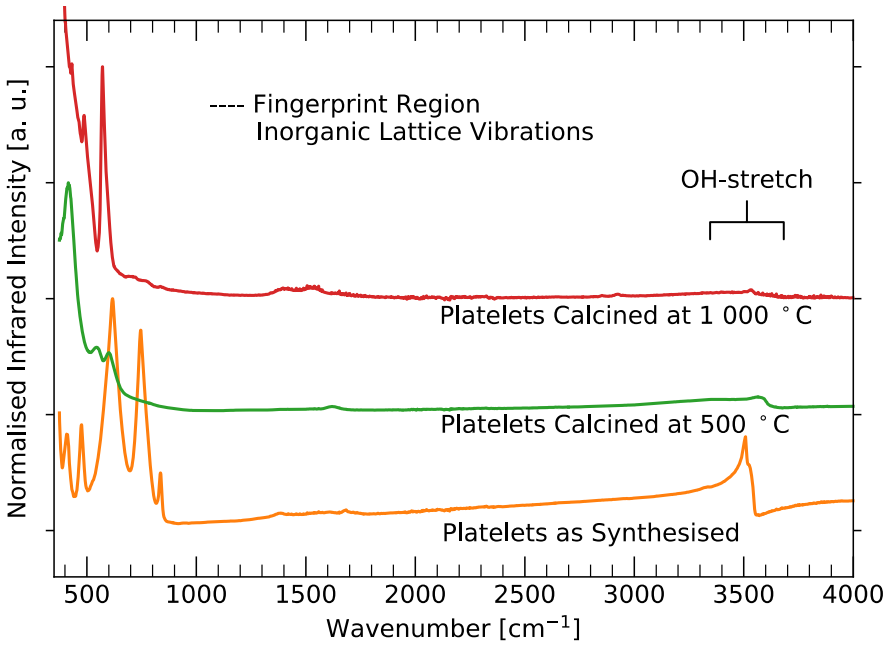

Figure S3: IR spectra of platelets as synthesised, calcined at 500 °C and platelets calcined at 1000 °C.

	IR Peak [cm^{-1}]	Assignment
Platelets as synthesised	3508	OH-stretch, crystalline OH from $Lu(OH)_2Cl$
	746	Inorganic lattice vibration (Lu-OH, Lu-Cl)
	617	Inorganic lattice vibration (Lu-OH, Lu-Cl)
Platelets calcined at 500 °C	415	Inorganic lattice vibration (Lu-OH)
Platelets calcined at 1000 °C	572	Inorganic lattice vibration (Lu-O)

Table S1: IR-peak values and assignments.

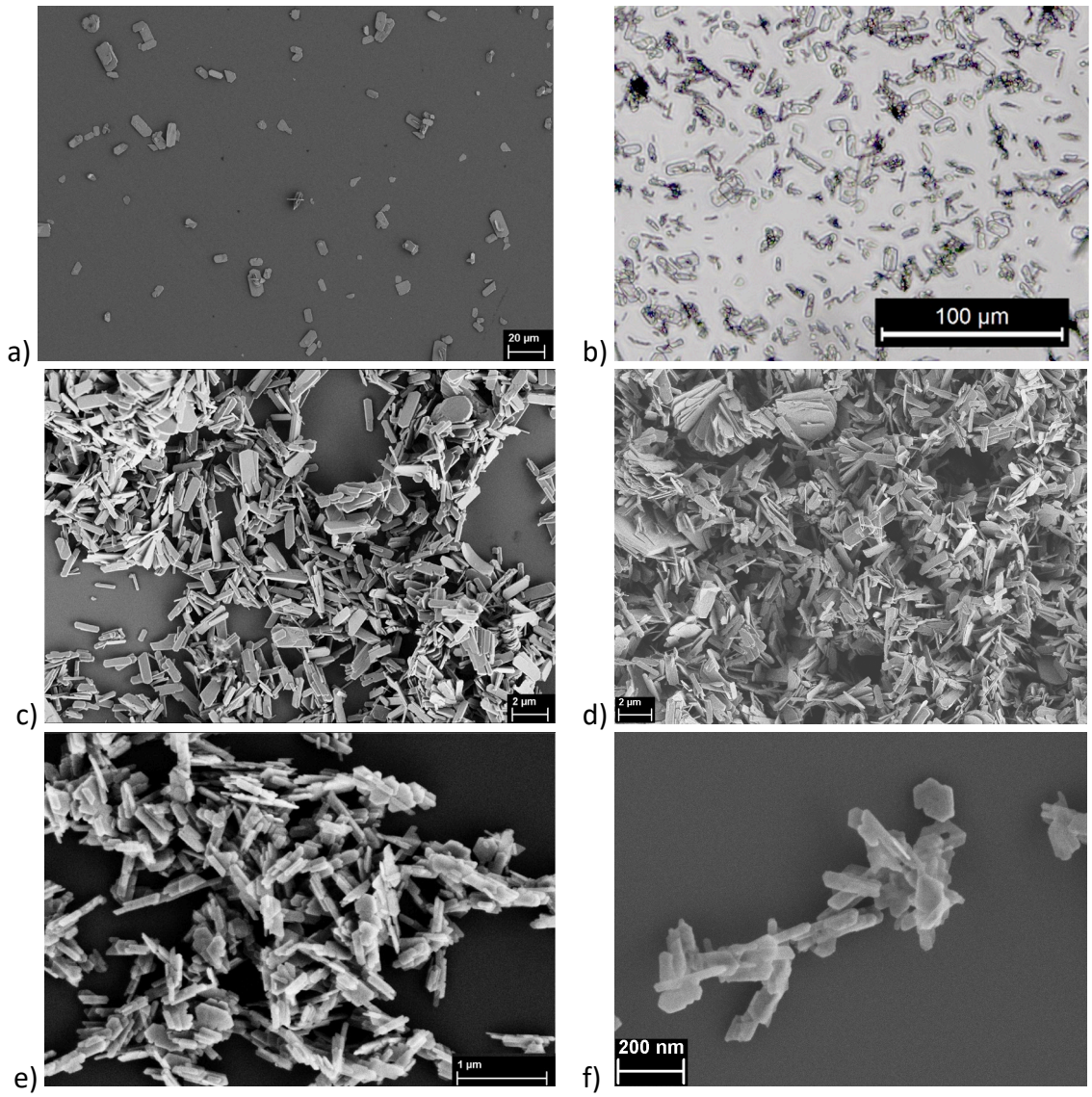

Figure S4: Evolution of the particle morphology during annealing. a): SEM of sample A before heat treatment. b): optical micrograph of the same powder sample after calcination at 1000 °C, dispersed in water. c) and d): SEM micrographs of sample B before and after heat treatment at 1000 °C, respectively. e) and f): SEM micrographs of sample C before and after heat treatment at 1000 °C, respectively.

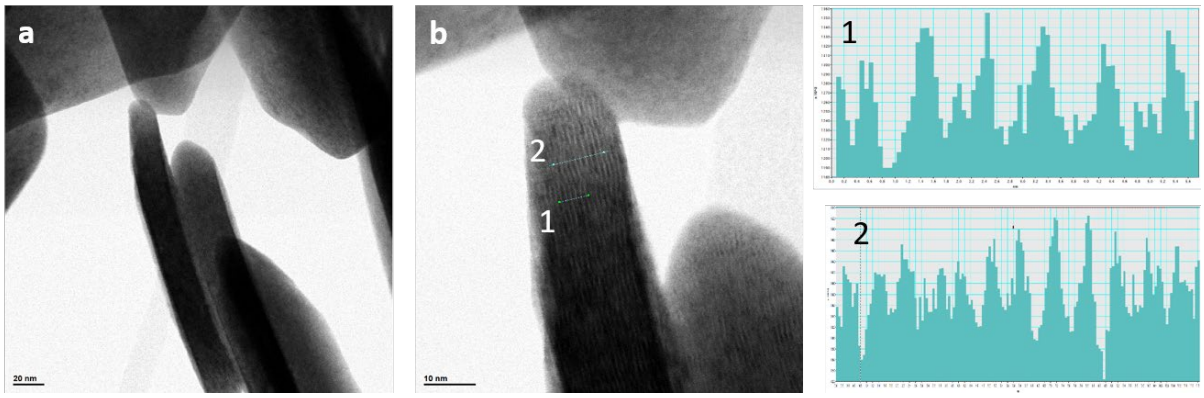

Figure S5: HR TEM platelet side view (sample C). a): Overview of area pictured. b): Detail of the edge of one Eu:Lu(OH)$_2$Cl platelet. 1 and 2: intensity profiles collected along the lines visible in panel b).

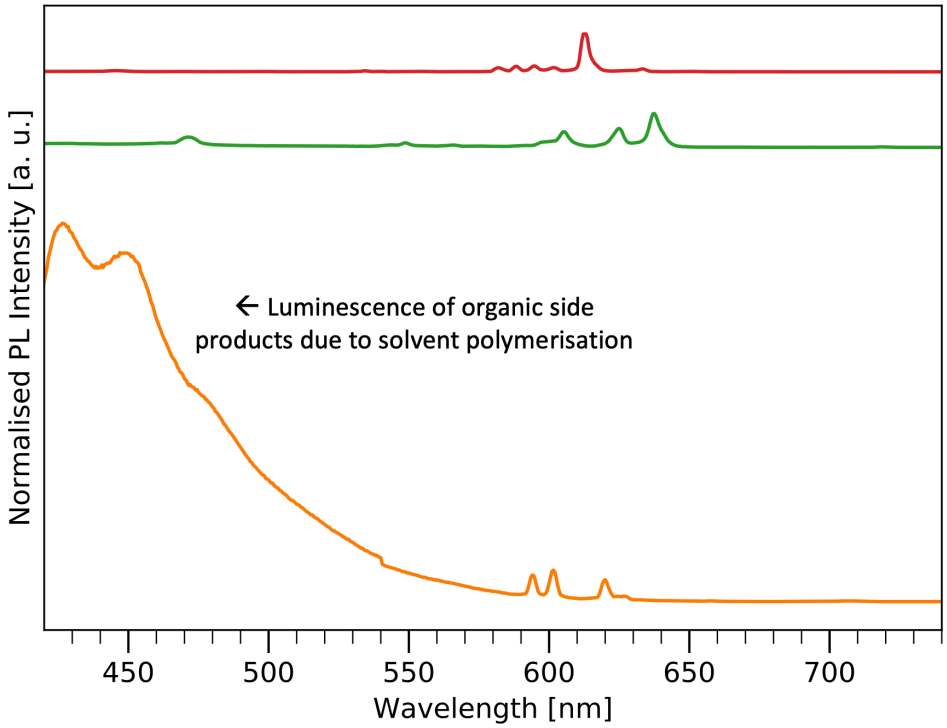

Figure S6: PL spectra of as prepared Eu:Lu(OH)$_2$Cl (orange line), of the platelets calcined at 500 °C (green line) and of Eu:Lu$_2$O$_3$ platelets obtained after calcination at 1000 °C (red line) excited at 394, 270 and 252 nm, respectively. Before calcination, the luminescence of organic side-products deriving from the solvent polymerisation can be observed in the blue spectral region (orange line spectrum). Such fluorescence disappears in the calcined samples, due to the degradation of the organic residuals in the sample (red line spectrum).

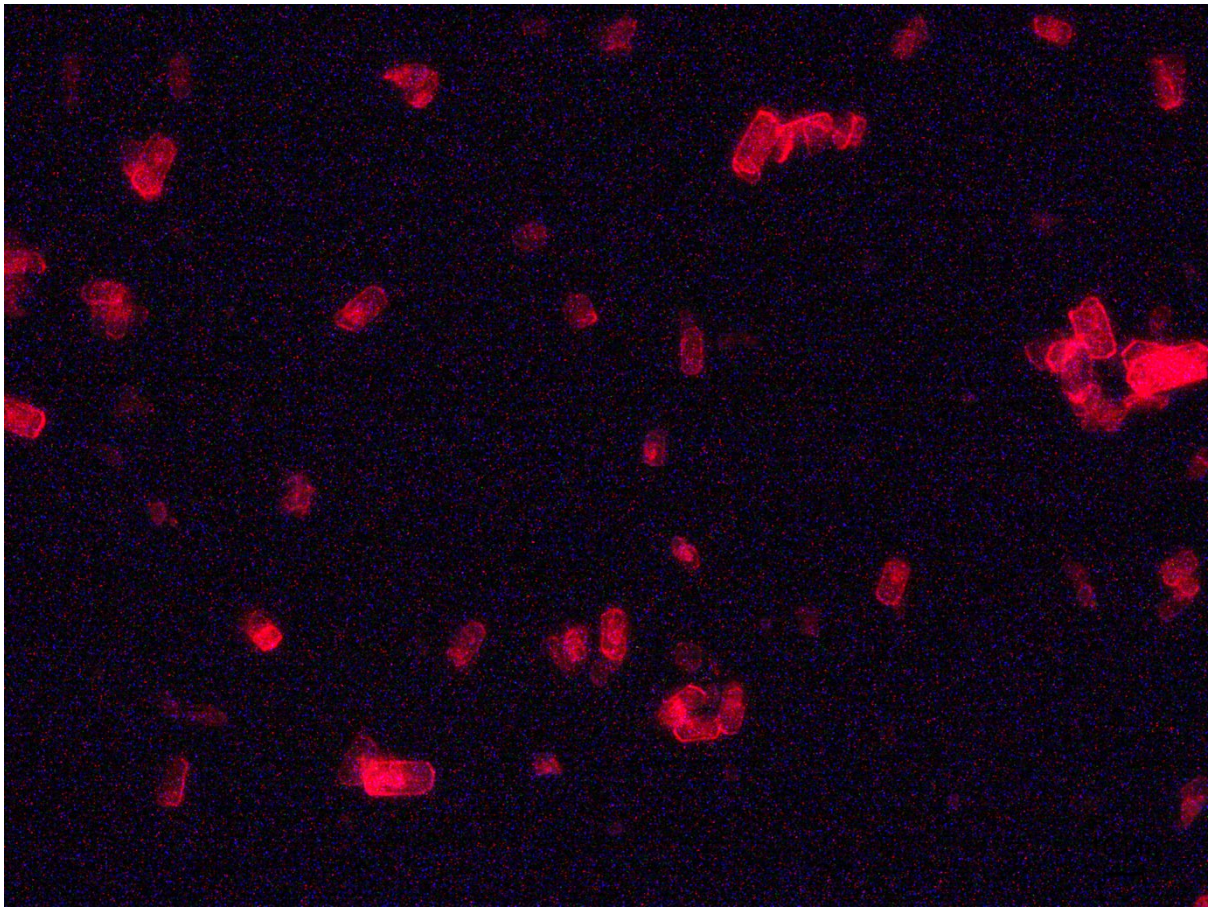

Figure S7: The red luminescence of Eu^{3+} within calcined Lu_2O_3 platelets as observed in the optical micrograph recorded under UV-illumination at 254 nm.