LANTHANIDE-BASED LUMINESCENT NANOGUMBOS

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Supporting Information:

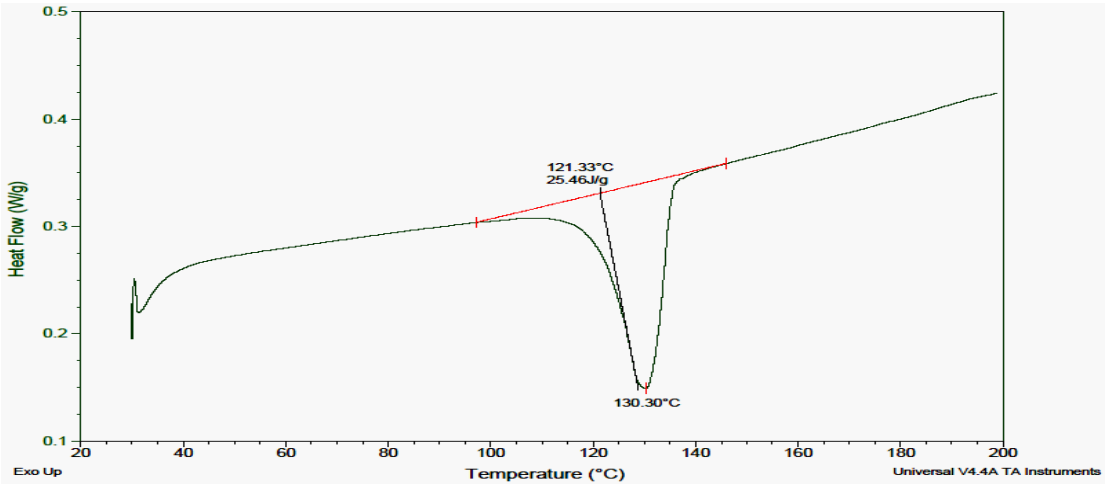


Figure S1. Differential scanning calorimetry melting point of the GUMBOS, $[C_6mim][Eu(tta)_4]$.

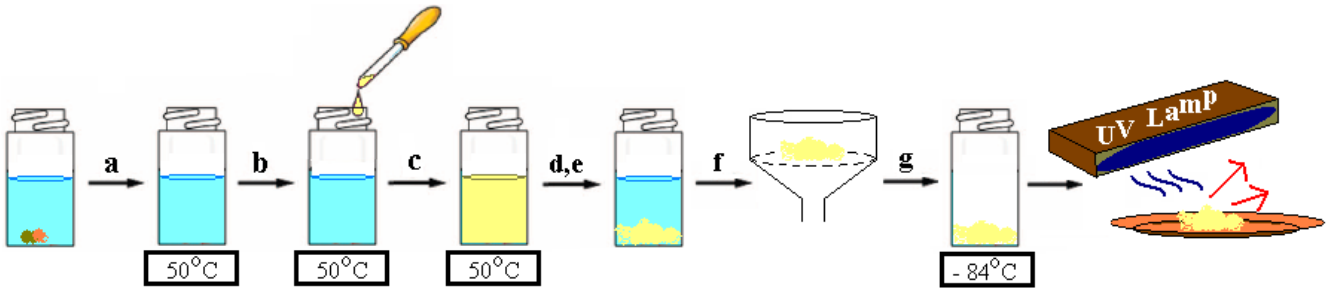


Figure S2. (a) Materials were combined and allowed to mix at 298 K until dissolved. (b) At 323 K added $EuCl_3 \cdot 6H_2O$ (aq). (c) Allowed to mix at 323 K for 90 minutes. (d) Permitted to settle and cool to room temperature overnight. (e) Removed decantant and washed with cold DI H_2O. (f) Vacuum filtered the solid with cold DI H_2O. (g) Lyophilized for 30 hours.[1]

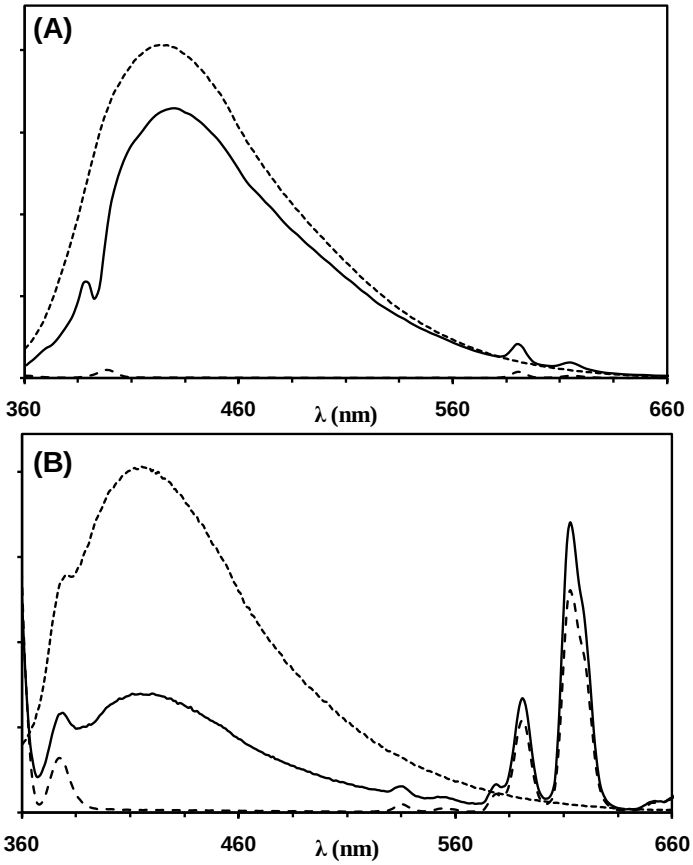


Figure S3. Energy transfer was observed from the [C_6mim] to the europium (III) in aqueous (A) and ethanol (B) solutions when excited at 340 nm with slit widths at 5 nm. A concentration of 0.5 M [C_6mim] and 0.5 M europium (III) was compared to show that the pure 0.5 M [C_6mim] (dotted line) has a higher emission intensity than when 0.5 M europium (III) is added (bold line) and a 0.5 M europium (III) solution (dashed line).

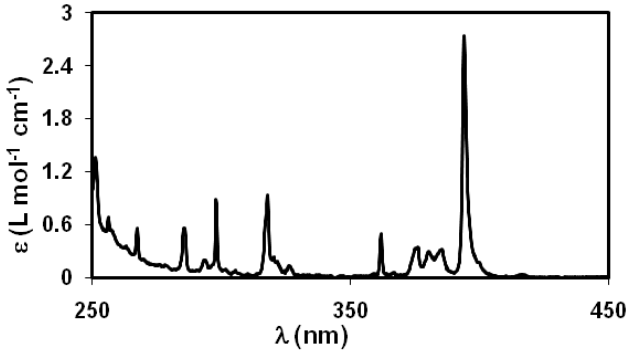


Figure S4. Absorption of 0.1 M $EuCl_3$ dissolved in water.

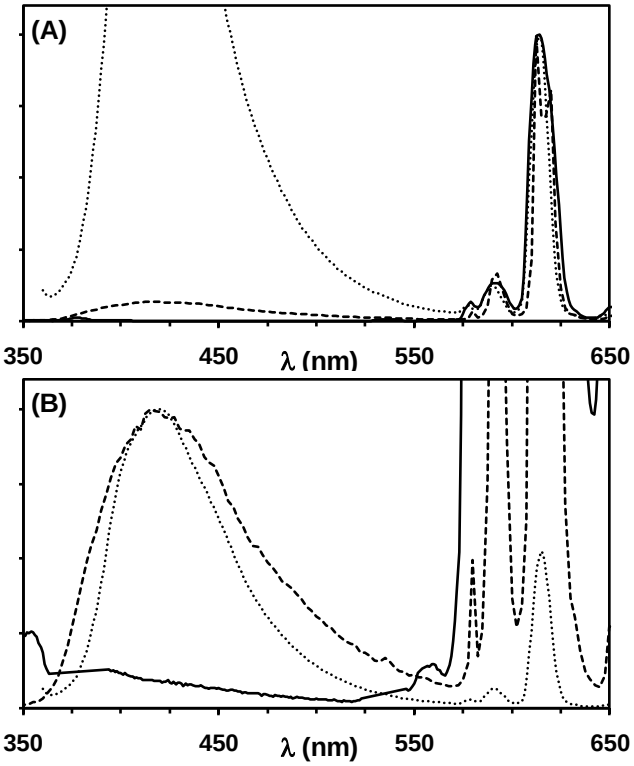


Figure S5. Normalized emission spectra of GUMBOS dissolved in ethanol (solid) and $[C_6mim][Tf_2N]$ (dash), and nanoGUMBOS in water (dot) while focusing on the emissions directly from (A) $[C_6mim]$ and (B) europium (III) when excited at 340 nm. (Note: The ethanol Raman peaks were removed for clarity.)

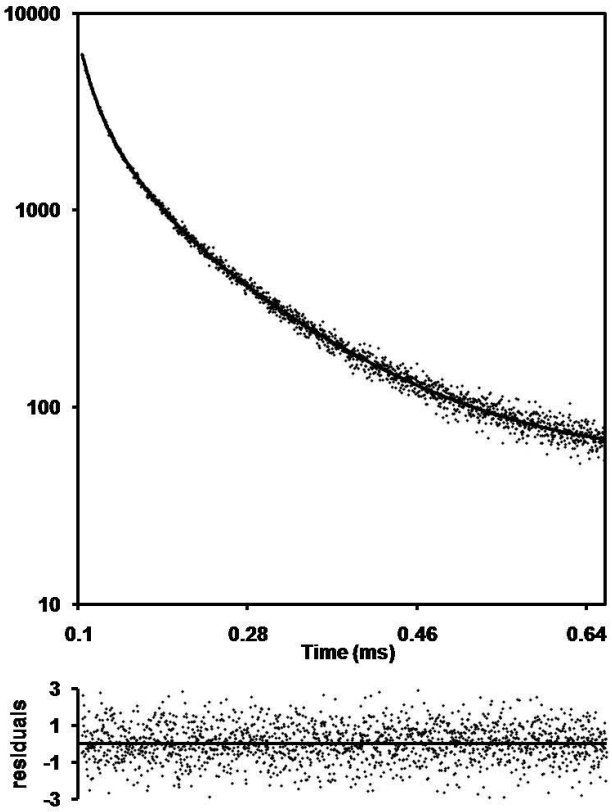
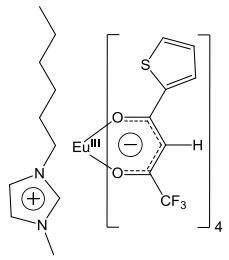
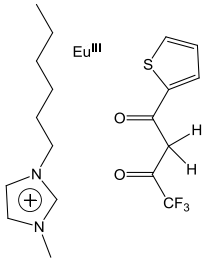


Figure S6. Time-domain europium (III) emission decay time of aerosolized nanoparticles, $[C_6mim][Eu(tta)_4]$, resuspended in water.

Table S1. The overlap integral (J) and energy transfer efficiency (E) from donor (C_6mim^+) to acceptor (Eu^{3+}) in a 1:1 ratio.

Material (solvent)	J (cm^6mol^{-1})	E
1) GUMBOS (ethanol)	3.96×10^{-15}	65.7%
2) NanoGUMBOS (water)	2.36×10^{-16}	7.48%

Table S2. Elemental analysis (CHNOFS-results) of the dry GUMBOS including the theoretical element percentage of the elements with the beta-diketonate chelated to the europium (III) (i.e. GUMBOS and nanoGUMBOS) and if there was not chelation. The percent difference supports that the beta-diketone chelates to the europium (III).

Elemental Analysis					
Element	Experimental%	 Theor.%	%Diff.	 Theor.%	%Diff.
C	41.24	41.90	1.6	41.76	1.2
H	2.78	2.93	5.1	3.25	14.5
N	2.36	2.33	1.3	2.32	1.7
O	11.15	10.63	4.9	10.60	5.2
F	19.21	18.94	1.4	18.87	1.8
S	10.29	10.65	3.4	10.62	3.1

References

1. Nockemann, P.; Beurer, E.; Driesen, K.; Van Deun, R.; Van Hecke, K.; Van Meervelt, L.; Binnemans, K. *Chem. Comm.* **2005**, 4354-4356.