Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting information

Rare-earth UiO-66 for temperature sensing near room temperature

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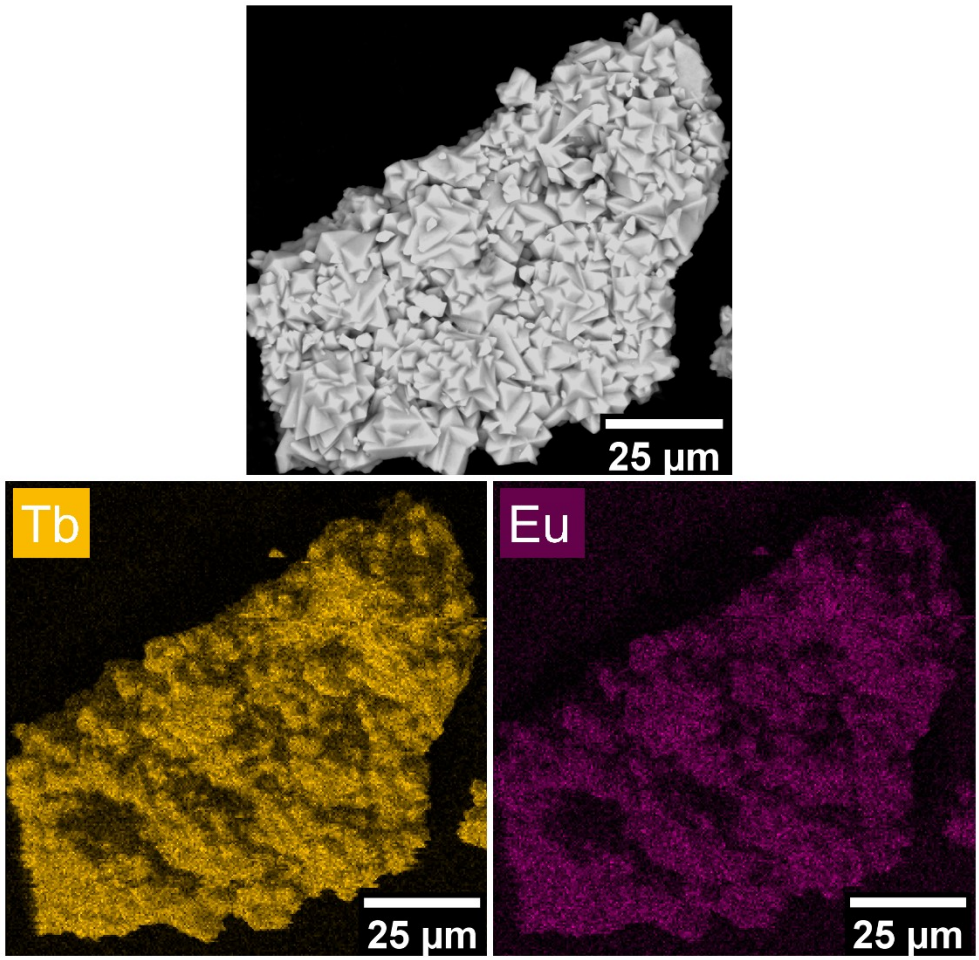

Figure S1. Scanning electron microscopy (SEM) image and elemental mapping of Tb and Eu for $Tb_{5.94}Eu_{0.06}$-UiO-66.

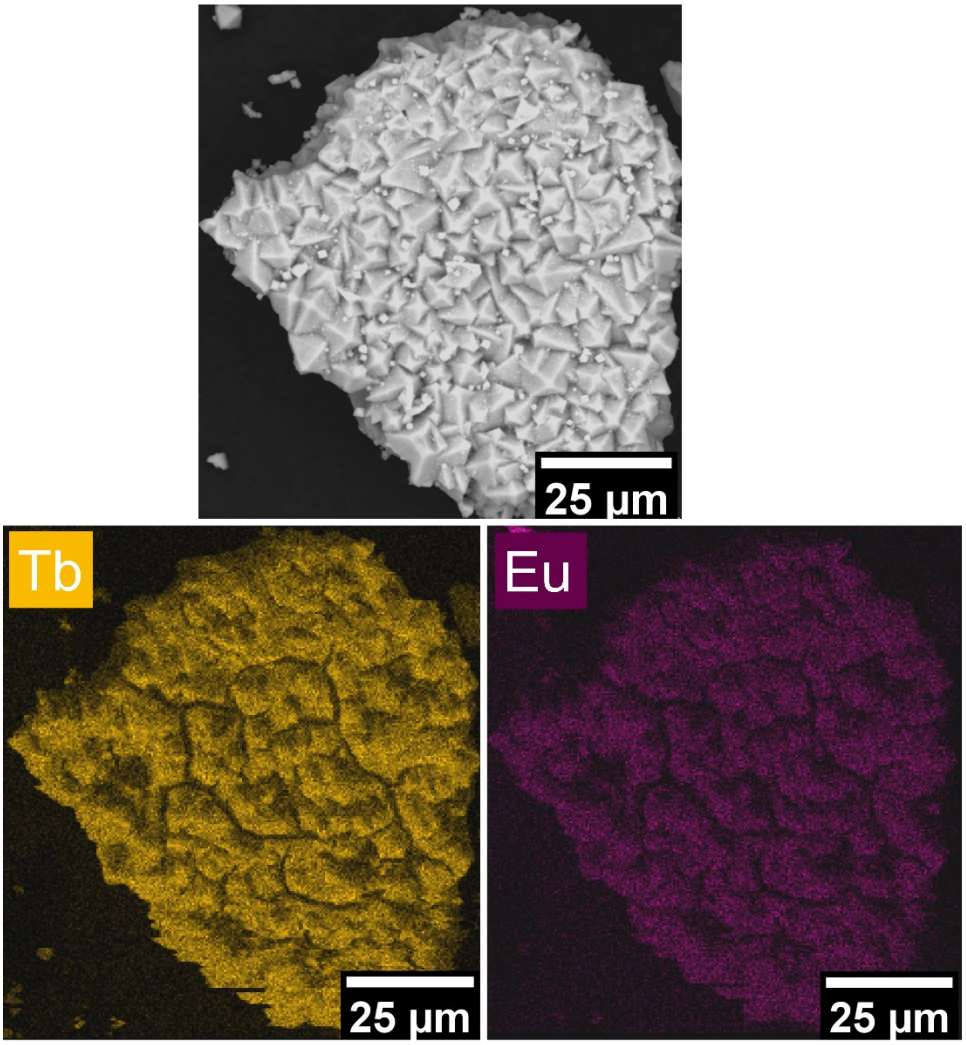

Figure S2. Scanning electron microscopy (SEM) image and elemental mapping of Tb and Eu for $Tb_{5.82}Eu_{0.18}$-UiO-66.

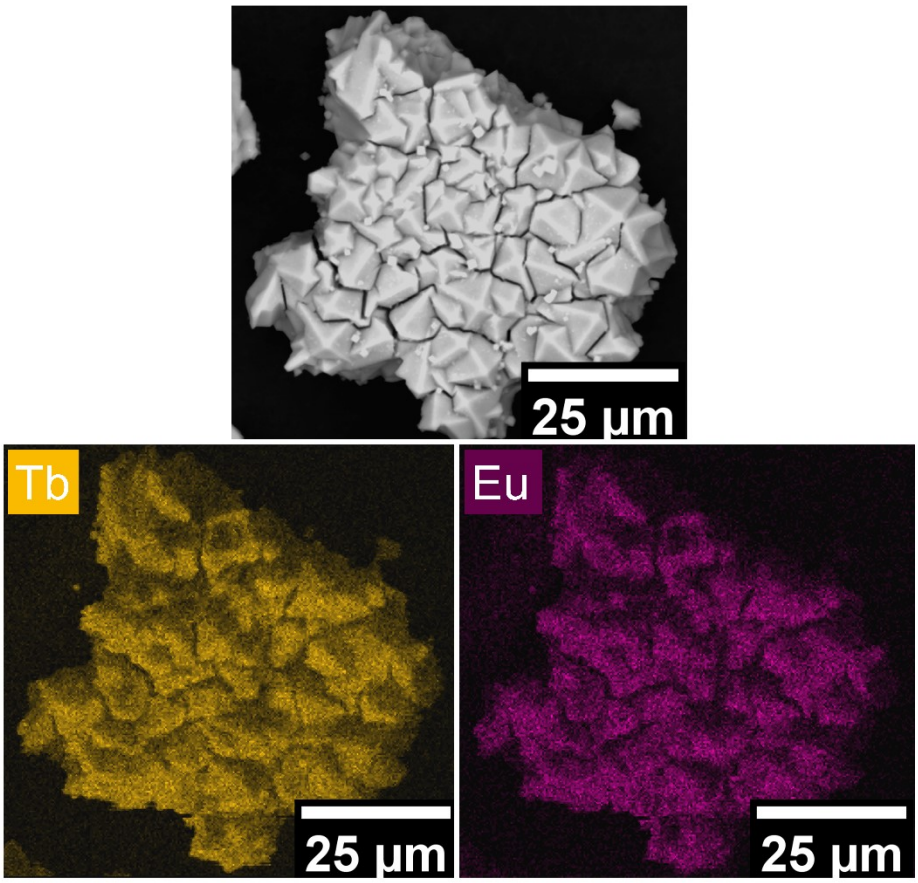

Figure S3. Scanning electron microscopy (SEM) image and elemental mapping of Tb and Eu for $Tb_{5.58}Eu_{0.42}$-UiO-66.

Table S1: EDS and ICP composition of the compounds **$Tb_{6-x}Eu_x$-UiO-66**.

Theoretical composition	EDS composition	ICP composition
$Tb_{5.94}Eu_{0.06}$-UiO-66	98.86% (Tb) and 1.14% (Eu) $Tb_{5.94}Eu_{0.07}$	99.06 ± 0.12% (Tb) and 0.94 ± 0.12% (Eu)
$Tb_{5.82}$ $Eu_{0.18}$-UiO-66	97.09% (Tb) and 2.91% (Eu) $Tb_{5.82}Eu_{0.18}$	97.43 ± 0.04% (Tb) and 2.57 ± 0.04% (Eu)
$Tb_{5.58}Eu_{0.42}$-UiO-66	93.03% (Tb) and 6.97%(Eu) $Tb_{5.58}Eu_{0.42}$	93.99 ± 0.14% (Tb) and 6.01 ± 0.14% (Eu)

Table S2. Chromaticity coordinates of compounds **$Tb_{6-x}Eu_x$-UiO-66** excited at 296 nm.

Compound	(x;y) coordinates
Tb-UiO-66	(0.358 ; 0.582)
$Tb_{5.94}Eu_{0.06}$-UiO-66	(0.360 ; 0.559)
$Tb_{5.82}$ $Eu_{0.18}$-UiO-66	(0.399 ; 0.536)
$Tb_{5.58}Eu_{0.42}$-UiO-66	(0.465 ; 0.498)

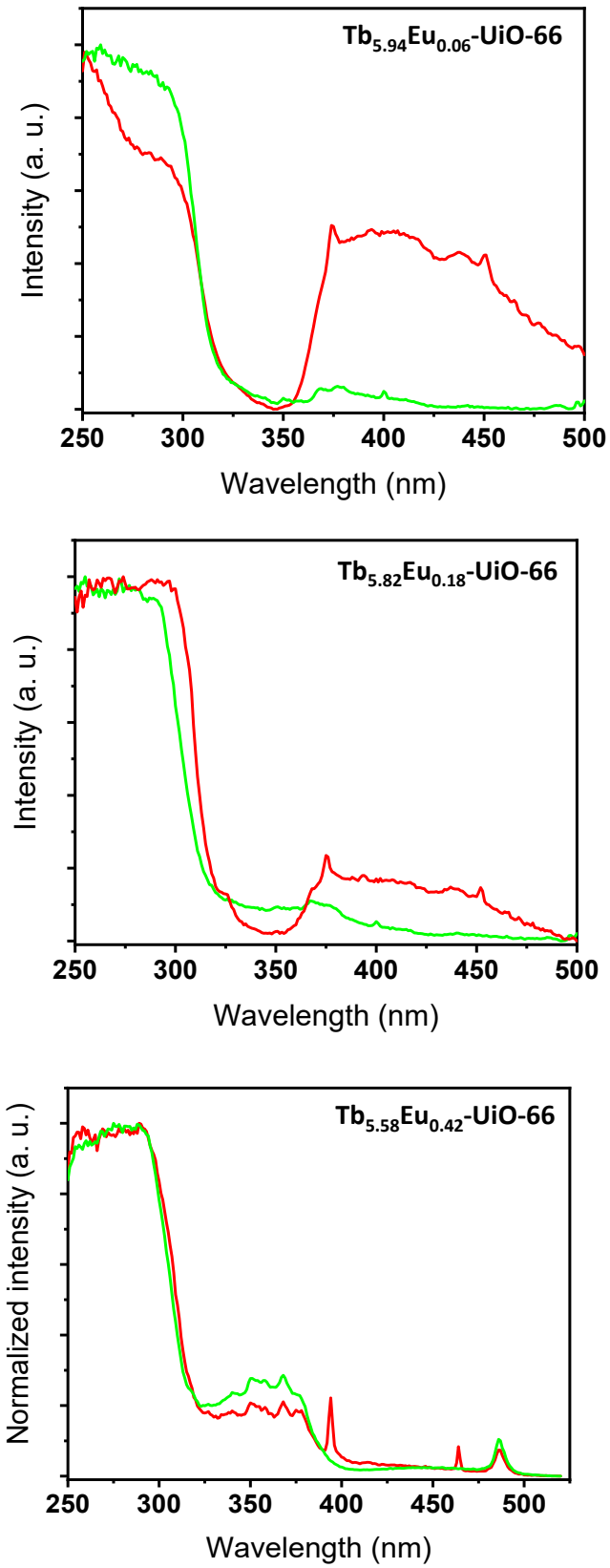

Figure S4. Room temperature excitation spectra of monitoring at 614 nm ($^5D_0 \nleftarrow {}^7F_2$ transition of Eu^{3+}, red line) and at 544 nm ($^5D_4 \nleftarrow {}^7F_5$ transition of Tb^{3+}, green line) of **$Tb_{6-x}Eu_x$-UiO-66** materials.

Table S3. Room temperature lifetimes of $^5D_4$ (Tb^{3+}) and $^5D_0$ (Eu^{3+}) obtained from the decay curve fitting with a single exponential model.

Compound	$^5D_4$ (µs)	$^5D_0$ (µs)
Tb-UiO-66	1212 ± 9	##
$Tb_{5.94}Eu_{0.06}$-UiO-66	1850 ± 40	1516 ± 2
$Tb_{5.82}$ $Eu_{0.18}$-UiO-66	1540 ± 20	1850 ± 10
$Tb_{5.58}Eu_{0.42}$-UiO-66	1520 ± 20	1303 ± 2

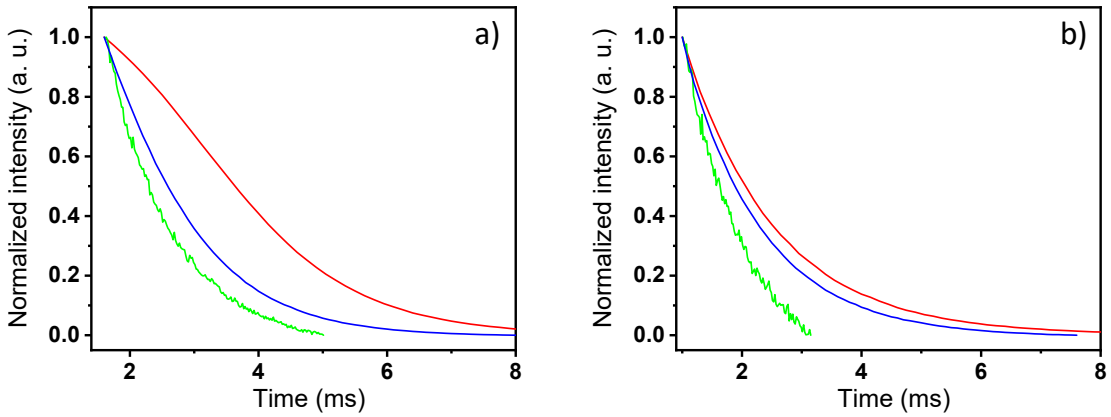

Figure S5. a) Decay curves of the $^5D_4$ ✂ $^7F_5$ transition of Tb^{3+} in **$Tb_{5.94}Eu_{0.06}$-UiO-66** (red line), **$Tb_{5.82}Eu_{0.18}$-UiO-66** (green line), and **$Tb_{5.58}Eu_{0.42}$-UiO-66** (blue line), b) Decay curves of the $^5D_0$ ✂ $^7F_2$ transition of Eu^{3+} in **$Tb_{5.94}Eu_{0.06}$-UiO-66** (red line), **$Tb_{5.82}Eu_{0.18}$-UiO-66** (green line), and **$Tb_{5.58}Eu_{0.42}$-UiO-66** (blue line)

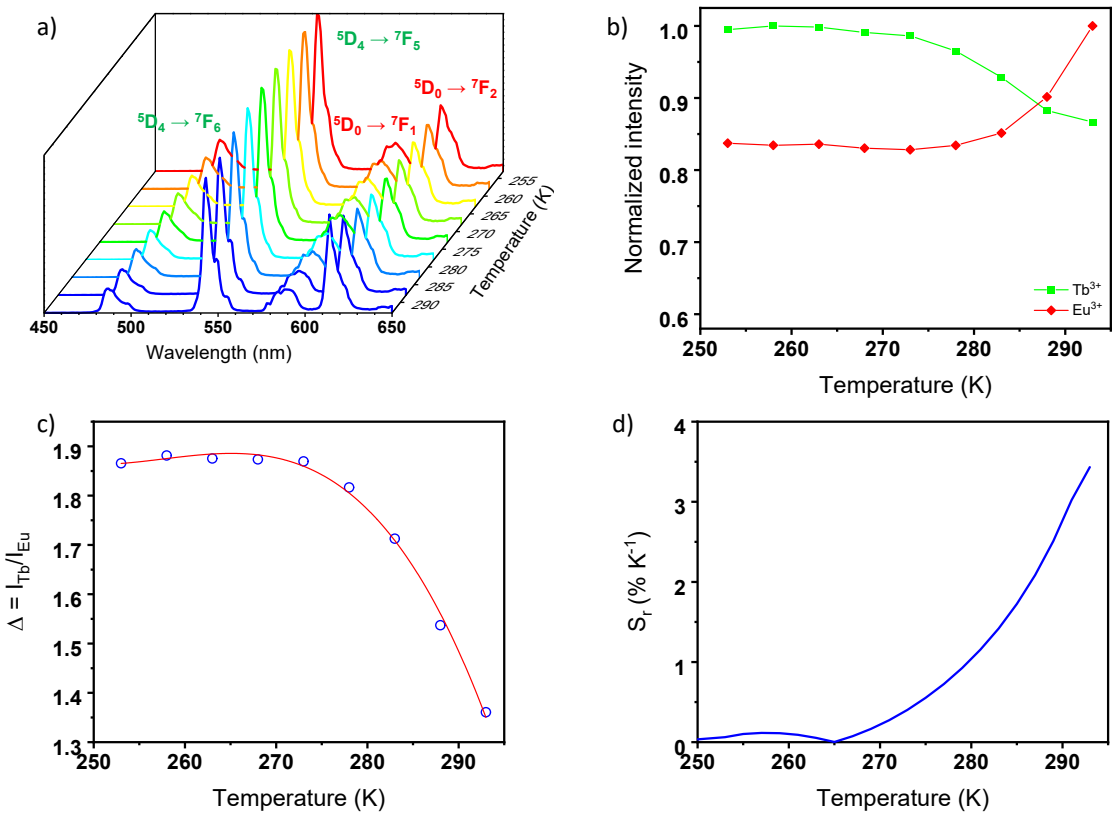

Figure S6. a) Temperature-dependent emission spectra in the 255-295 K range of **$Tb_{5.82}Eu_{0.18}$-UiO-66** upon 296 nm excitation. b) Corresponding dependence of the normalized integrated areas of I_{Tb} ($^5D_4 \rightarrow {}^7F_5$) and I_{Eu} ($^5D_0 \rightarrow {}^7F_2$). c) Temperature dependence of the thermometric parameter $\Delta = I_{Tb}/I_{Eu}$, and d) Relative thermal sensitivity for the mixed compound.

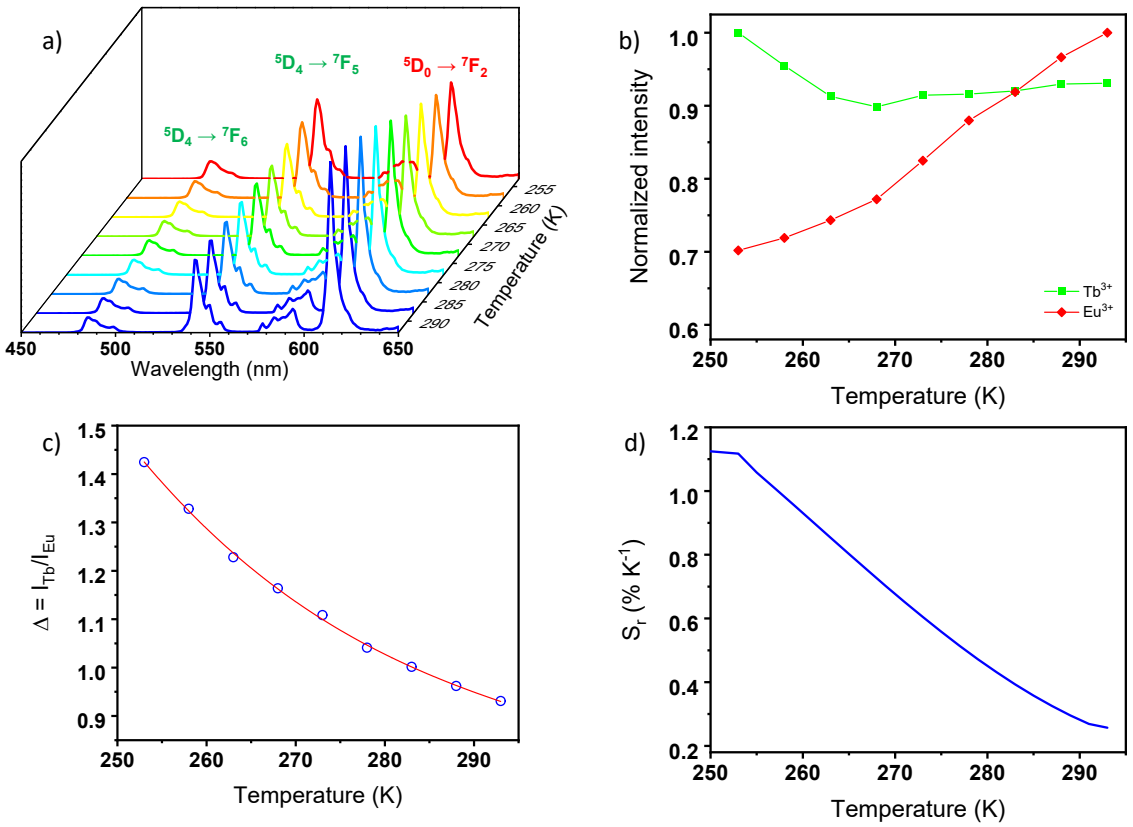

Figure S7. a) Temperature-dependent emission spectra in the 255-295 K range of **$Tb_{5.58}Eu_{0.42}$-UiO-66** upon 296 nm excitation. b) Corresponding dependence of the normalized integrated areas of I_{Tb} ($^5D_4 \rightarrow {}^7F_5$) and I_{Eu} ($^5D_0 \rightarrow {}^7F_2$). c) Temperature dependence of the thermometric parameter $\Delta = I_{Tb}/I_{Eu}$, and d) Relative thermal sensitivity for the mixed compound.

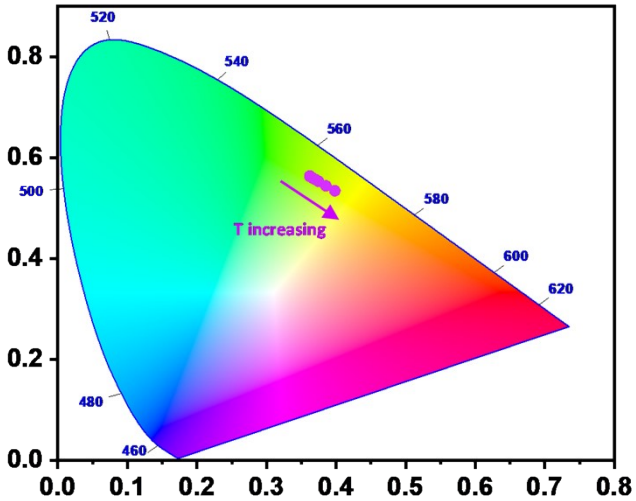

Figure S8. Thermal evolution of CIE chromaticity diagram of the **$Tb_{5.94}Eu_{0.06}$UiO-66** samples calculated from emission spectra between 255 and 295 K.

Table S4. Fitting parameters (A, B, C, and D) of calibrations curves $\Delta = f(T)$ according the following mathematical model :

$$\Delta = A + BT + CT^2 + DT^3$$

	A	B	C	D	R^2
$Tb_{5.94}Eu_{0.06}$-UiO-66	239 ± 148	-2.9 ± 1.6	0.012 ± 0.006	$-1.6.10^{-5} \pm 0.7.10^{-5}$	0.997
$Tb_{5.82}Eu_{0.18}$-UiO-66	235 ± 64	-2.7 ± 0.6	0.010 ± 0.002	$-1.4.10^{-5} \pm 0.3.10^{-5}$	0.993
$Tb_{5.58}Eu_{0.42}$-UiO-66	60 ± 27	-0.6 ± 0.3	0.002 ± 0.001	$-2.10^{-6} \pm 1.10^{-6}$	0.999

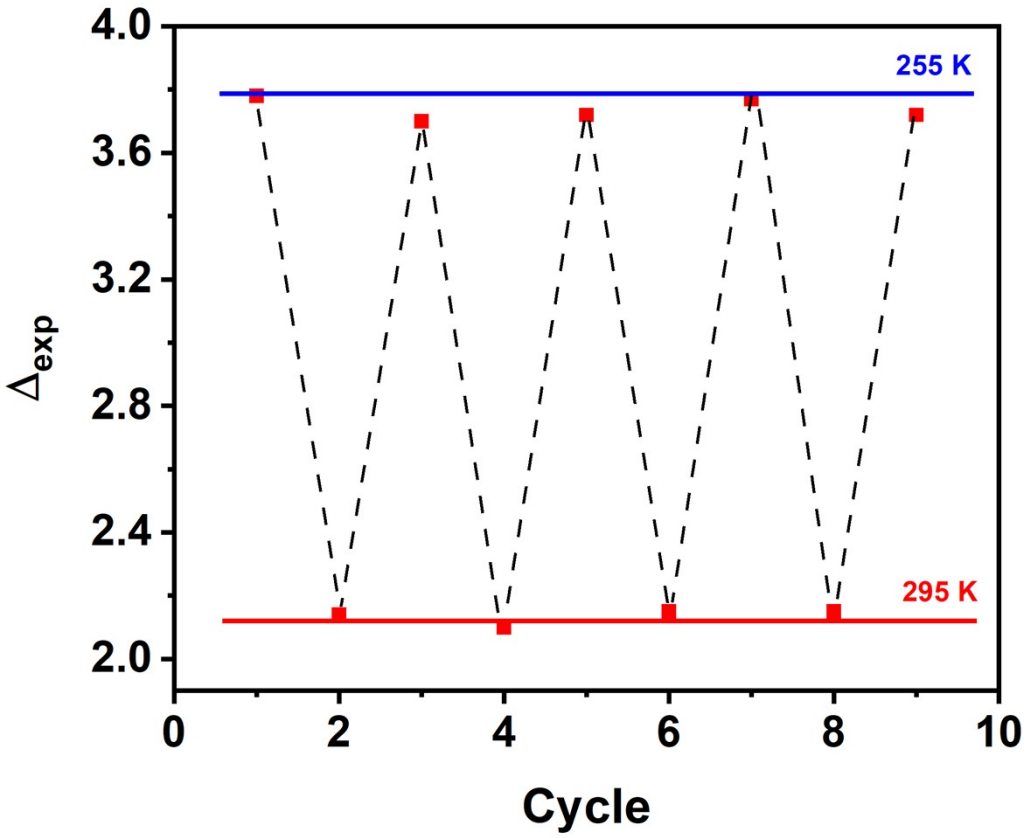

Figure S9: Temperature cycling between 255 and 295 K revealing a repeatability > 95% for the **$Tb_{5.94}Eu_{0.06}$-UiO-66** compound.