Electronic Supplementary Information (ESI) for

A vitrified film of an anisometric europium(III) β-diketonate complex with low melting point as a reusable luminescence temperature probe with excellent sensitivity in the range of 270-370 K

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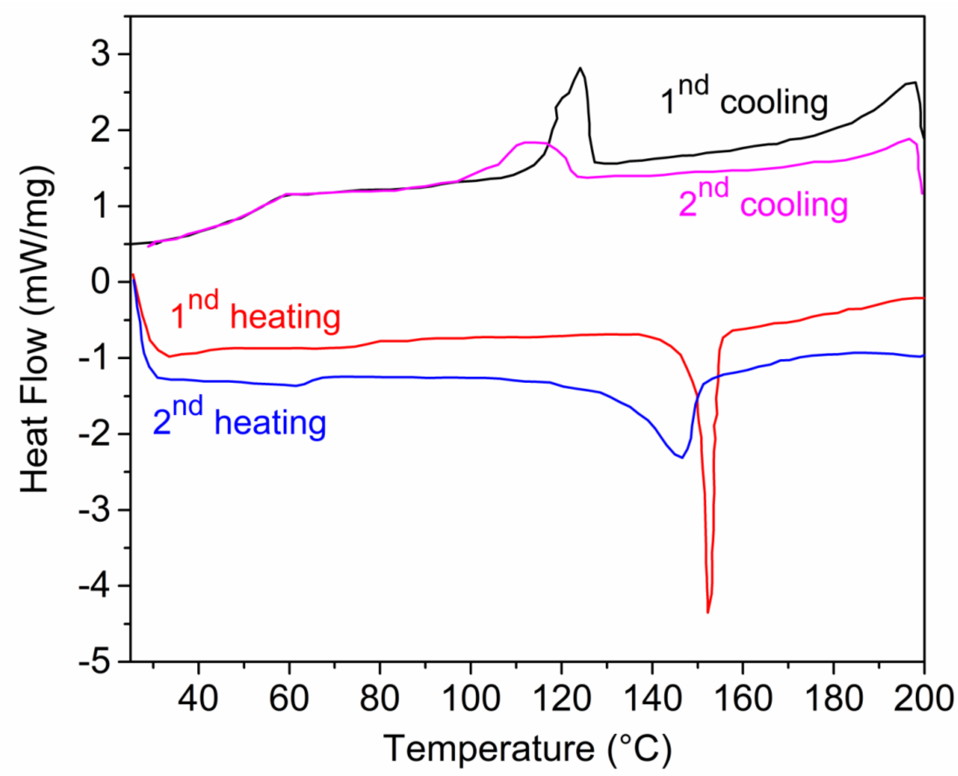

Fig. S1 DSC thermograms of the $Eu(DK_{12\text{-}14})_3phen$ complex.

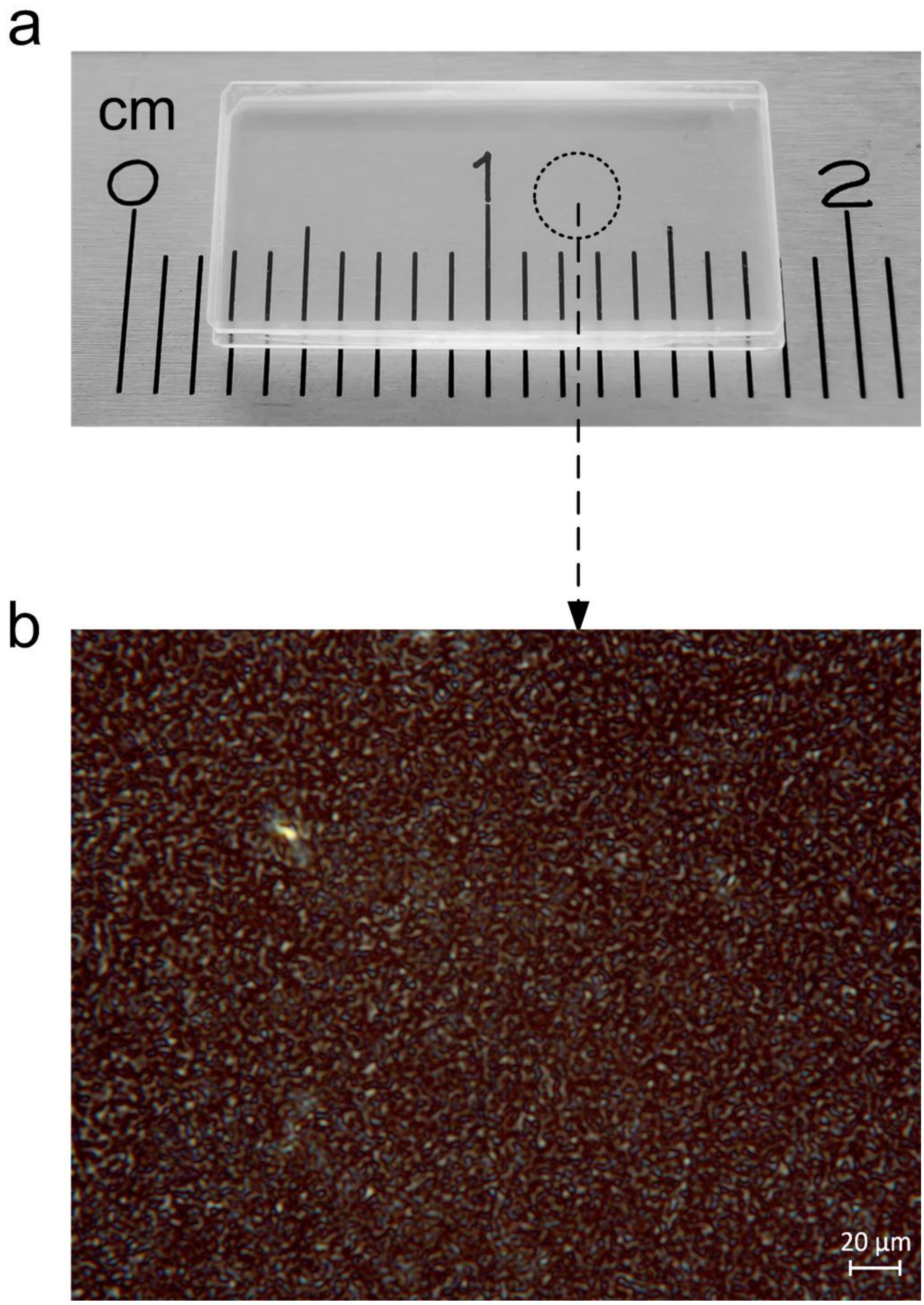

Fig. S2 (a) Photographic image of the 20 μm thick vitrified Eu(DK_{12-14})$_3$phen film sandwiched between two quartz plates with a size of 7 × 15 × 0.5 mm in daylight. Dashed ring indicates exposed surface area of the film. (b) Room temperature POM image of surface area of the Eu(DK_{12-14})$_3$phen film viewed under crossed polarizers and 500× magnification.

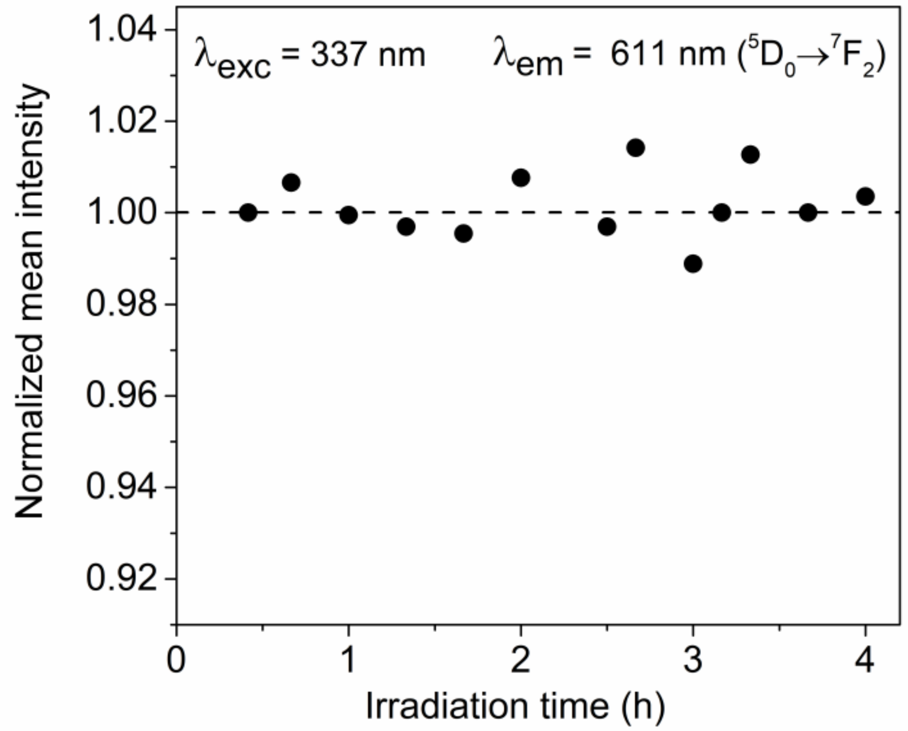

Fig. S3 Dependence of the normalized mean luminescence intensity of the 20 μm thick vitrified $Eu(DK_{12-14})_3phen$ film monitored at λ_{em} = 611 nm on the irradiation time by a 337 nm pulsed nitrogen laser with 0.05 mW average output power at room temperature. The solid circles are experimental data. The observed random changes in luminescence intensity are attributed to the instability of the laser (normally no more than 5%) operating on such long time interval.

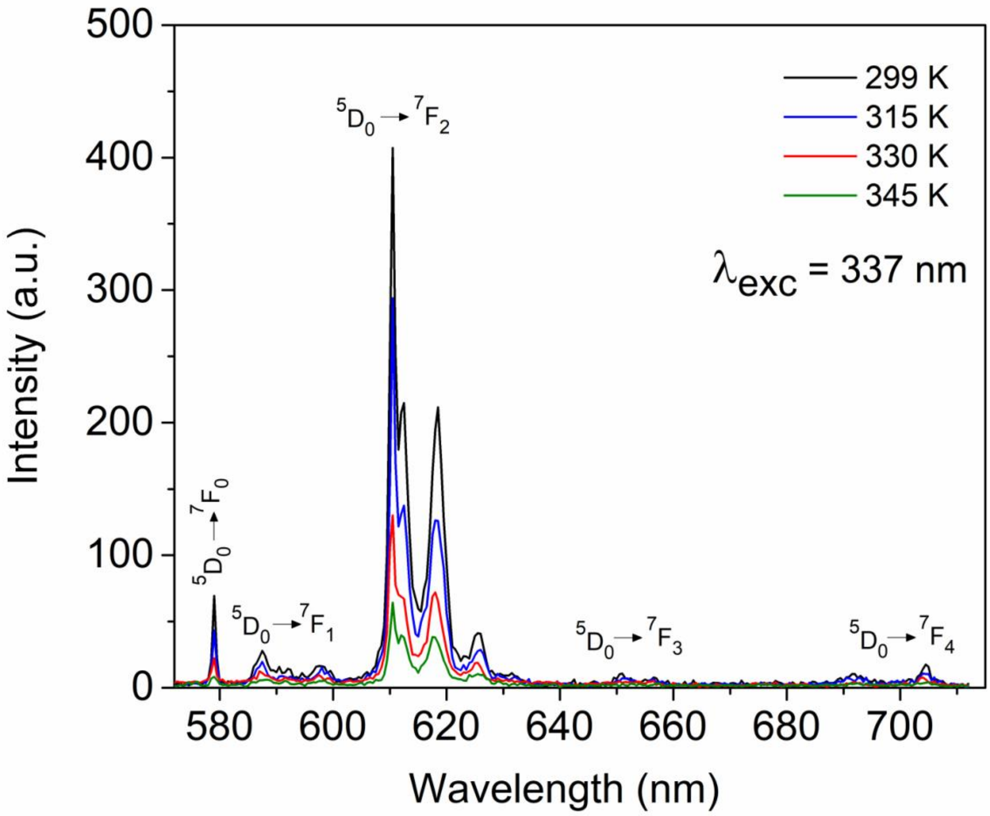

Fig. S4 Temperature dependence of the time-delayed luminescence spectrum of the 20 μm thick vitrified $Eu(DK_{12-14})_3phen$ film under the excitation by a 337 nm pulsed nitrogen laser with 0.05 mW average output power (the time delay is 10 μs).

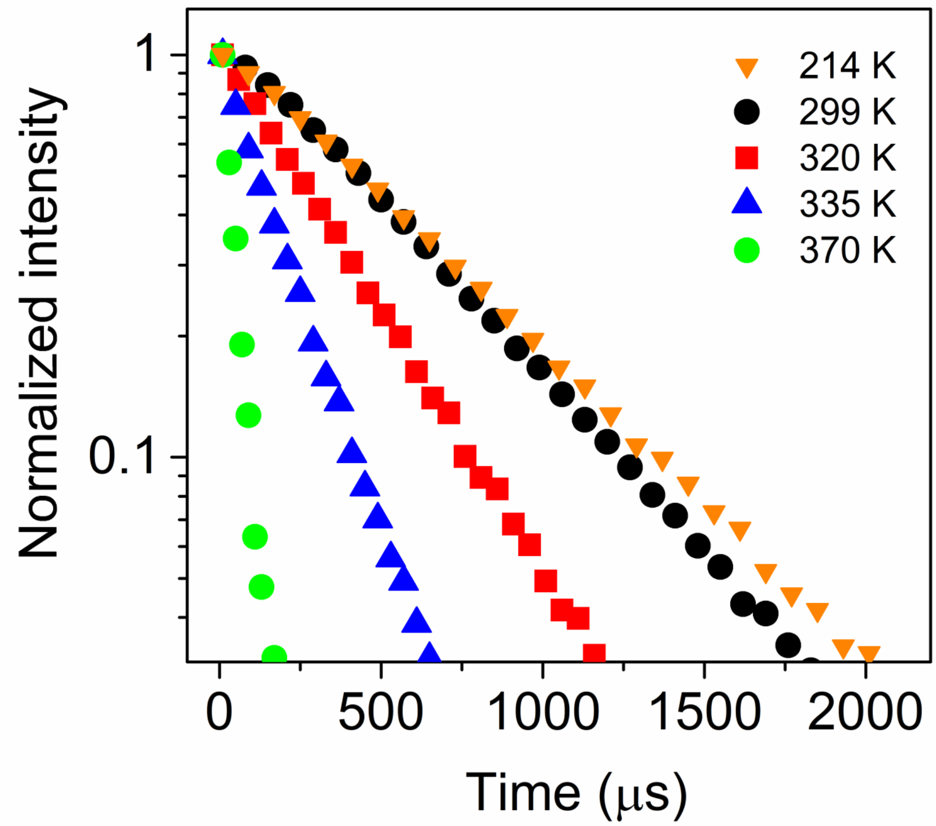

Fig. S5 Effect of temperature on the luminescence decay curve (λ_{exc}=337 nm, λ_{em}=611 nm) of the 20 μm thick vitrified $Eu(DK_{12-14})_3phen$ film.

Table S1 Parameters of the function $I(t) = A\exp(-t/\tau_{obs})$ fitting the luminescence decay curve (λ_{em}=611 nm) of the 20 μm thick vitrified $Eu(DK_{12\text{-}14})_3phen$ film at different temperatures.

Temperature (K)	*A*	τ (μs)	Correlation regression coefficient r^2	Goodness-of-fit parameter χ^2, 10^{-6}
214	1.1±0.001	580±1.2	0.99951	23
233	1±0.001	575±0.9	0.99968	15
254	1±0.001	574±0.8	0.99974	11
270	1±0.001	561±0.9	0.99968	14
293	1±0.001	533±0.8	0.9997	12
299	1.1±0.002	525±1.6	0.99905	51
305	1.1±0.002	484±1.2	0.99934	32
310	1.1±0.001	438±0.9	0.99952	21
315	1±0.001	385±0.7	0.9997	12
320	1±0.001	331±0.5	0.99974	9
325	1±0.001	269±0.4	0.99976	7
330	1±0.002	217±0.5	0.99956	15
335	1±0.002	175±0.6	0.99956	22
340	1±0.003	139±0.6	0.99848	33
345	1±0.004	109±0.7	0.99863	45
350	1.1±0.005	88±0.6	0.99842	47
355	1.1±0.01	68±0.7	0.99779	78
360	1.1±0.004	55±0.4	0.99888	35
365	1.2±0.01	44±0.6	0.99779	92
370	1.3±0.02	37±0.6	0.99609	142

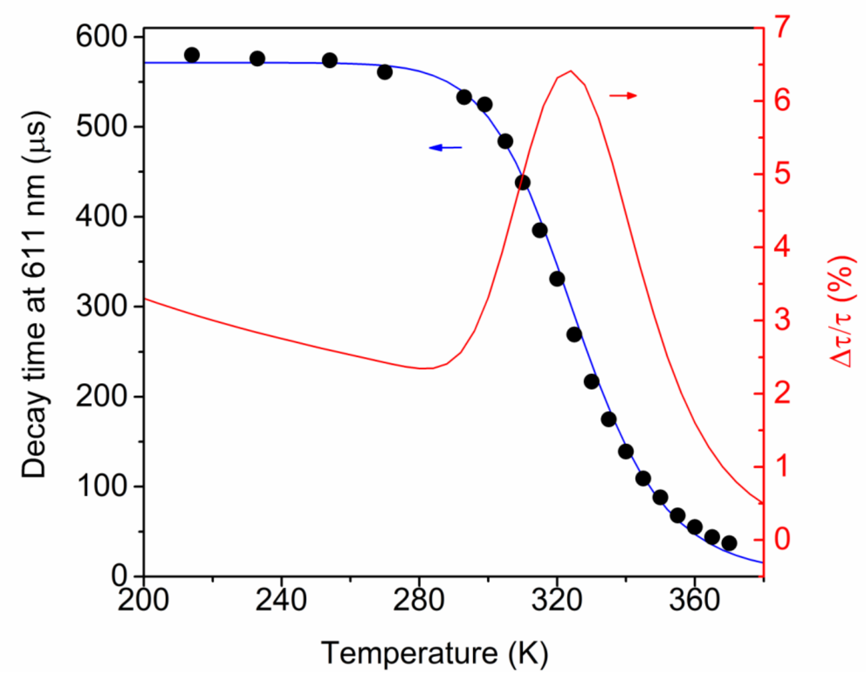

Fig. S6 Temperature-dependent luminescence decay time (monitored at λ_{em}= 611 nm) of the $Eu(DK_{12\text{-}14})_3phen$ film (solid circles are experimental data, blue line is simulation) under the excitation by a 337 nm pulsed nitrogen laser with 0.05 mW average output power and calculated luminescence decay time uncertainty (red line).

To simulate the observed luminescence decay time dependence on temperature $\tau_{obs}(T)$ we use a well-known function:

$$\tau_{obs}(T) = \left(K + R \cdot exp\left(-\frac{E}{kT}\right)\right),$$

where K is the rate constant, R is the pre-exponential factor, E is the activation energy and k is the Boltzmann's constant. Variation of the K, R and E constants makes possible to derive their values and roughly estimate their absolute measurement errors: $K \pm \Delta K$ = 174 ± 2 (10^3 s^{-1}), $R \pm \Delta R$ = 14 ± 1 (10^{13} s^{-1}), $E \pm \Delta E$ =5694 ± 28 cm^{-1}. In that case, the absolute error for indirect measurement $\tau_{obs}(T)$ is defined by the expression:

$$\Delta\tau_{obs}(T) = \left(\left(\frac{\partial\tau_{obs}(T)}{\partial K}\Delta K\right)^2 + \left(\frac{\partial\tau_{obs}(T)}{\partial R}\Delta R\right)^2 + \left(\frac{\partial\tau_{obs}(T)}{\partial E}\Delta E\right)^2 + \left(\frac{\partial\tau_{obs}(T)}{\partial T}\Delta T\right)^2\right)^{1/2},$$

where ΔT is constant and equals to 1 K for our experimental set up. The calculated relative measurement error $\Delta\tau_{obs}/\tau_{obs}$ is shown in Fig. S5 together with observed temperature dependence of the luminescence decay time $\tau_{obs}(T)$.