SUPPORTING INFORMATION

Chiral Nanostructures Derived from Europium (III) Complexes for Enhanced Circularly Polarised Luminescence and Antibacterial Activity

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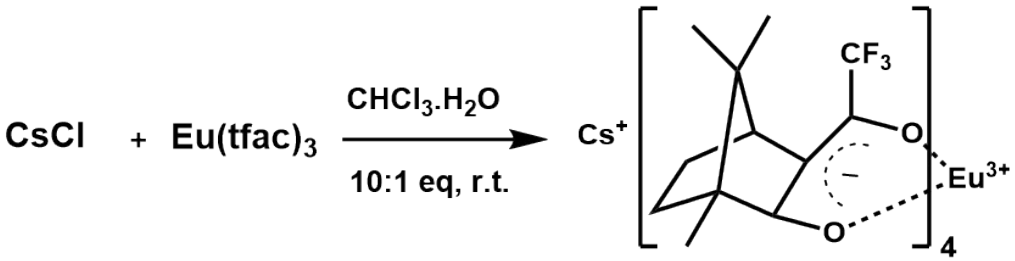

Figure S1. Synthetic scheme adopted the preparation of the Eu complex, $Cs^{+}[Eu((+)\text{-tfac})_4]^{-}$. Similar synthetic protocols were adopted for other complexes (Na, K and Rb) using the respective metal salts (Na_2SO_4, KCl and RbCl).

Table S1. Structural refinement and crystal data of $Cs^{+}[Eu((+)\text{-tfac})_4]^{-}$

Empirical formula	$C_{48}H_{56}CsEuF_{12}$	μ (Mo Kα)/cm^{-1}	20.315 cm^{-1}
Formula weight	1305.81	measured reflections	21982
Crystal system	Tetragonal	unique reflections	2909
Space group	I4 (#79)	Reflection/Parameter Ratio	17.21
a/A^{O}	17.4004(3)	Residuals: R1	0.0260
c/A^{O}	8.41371(15)	Residuals: Rw	0.0727
Z	2	goodness of fitting	1.191
V/$(A^{O})^{3}$	2547.45(8)	T/K	123

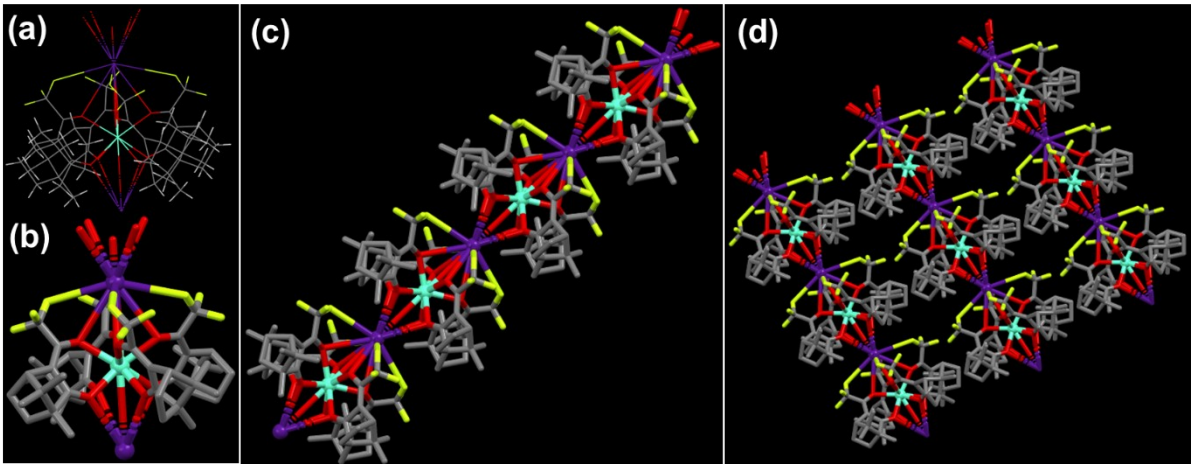

Figure S2. (a-c) X-ray crystal structure of (a,b) $Cs^{+}[Eu((+)\text{-tfac})_4]^{-}$ complex, (c) its one-dimensional array and (d) the network structures.

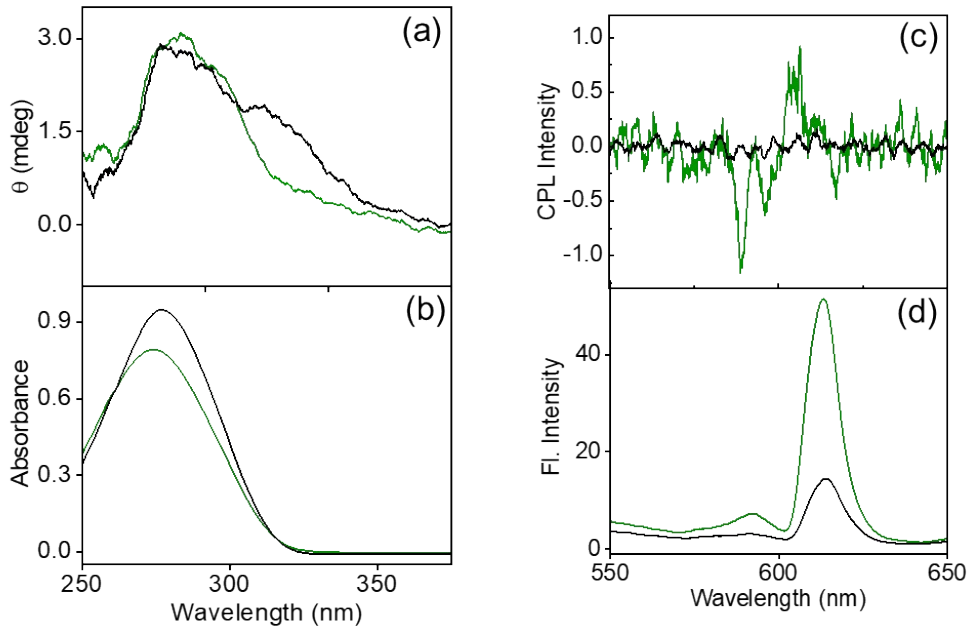

Figure S3. (a) CD, (b) absorption, (c) CPL and (d) luminescence spectra of $K^+[Eu(tfac)_4]^-$ (green traces) and $Na^+[Eu(tfac)_4]^-$ (black traces) in chloroform (concentration = 2.0 mM; excitation wavelength λ_{ex} = 317 nm).

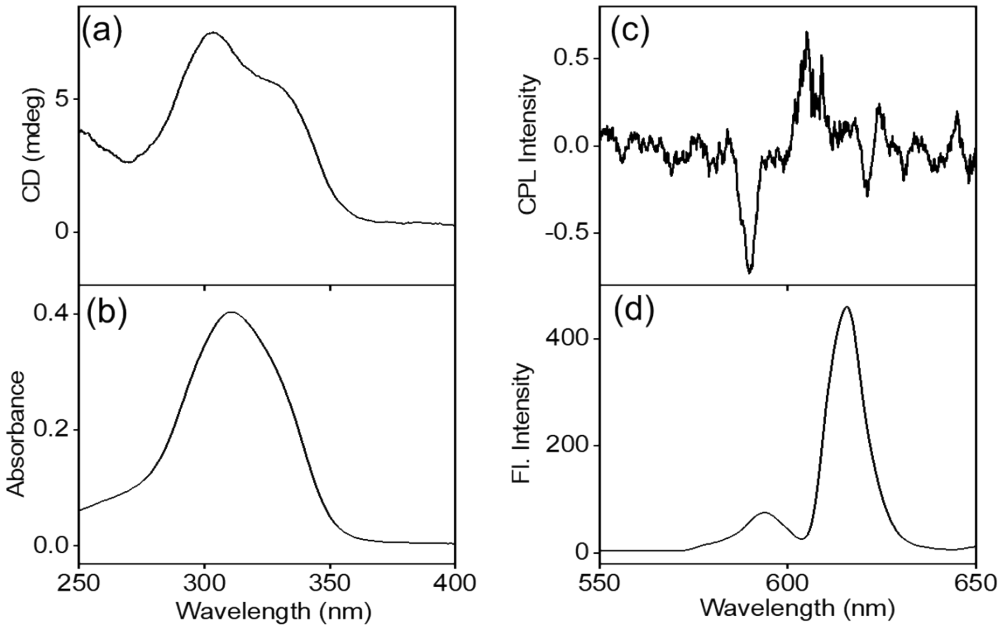

Figure S4. (a) CD, (b) absorption, (c) CPL and (d) luminescence spectra of Eu((+)-tfac)$_3$ in chloroform (concentration = 2.0 mM; excitation wavelength λ_{ex} = 352 nm).

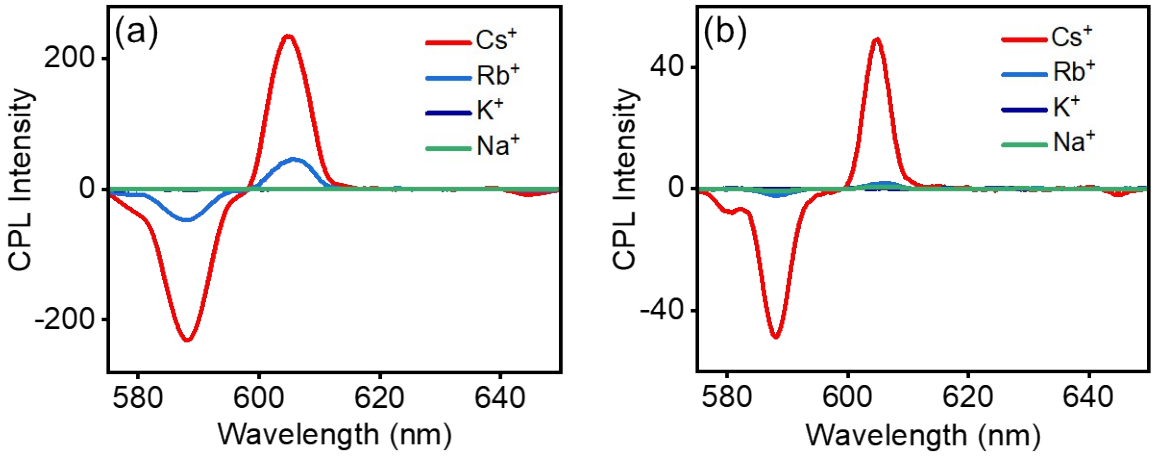

Figure S5. CPL spectra of (a) 2.0 mM and (b) 1.0 mM solution of the $M^{+}[Eu(tfac)_4]^{-}$ complexes (M = Cs, Rb, K, Na) in chloroform.

Table S2. The g_{lum} values of 2.0 mM and 1.0 mM solution the complexes in chloroform.

Chloroform (2.0 mM)			Chloroform (1.0 mM)		
M	g_{lum} ($^5D_0$ - $^7F_1$)	g_{lum} ($^5D_0$ - $^7F_2$)	**M**	g_{lum} ($^5D_0$ - $^7F_1$)	g_{lum} ($^5D_0$ - $^7F_2$)
Cs	-0.701	0.128	Cs	-0.513	0.046
Rb	-0.155	0.051	Rb	-0.145	0.047
K	-0.025	0.003	K	-0.020	0.025
Na	-0.005	0.001	Na	-0.001	0.002

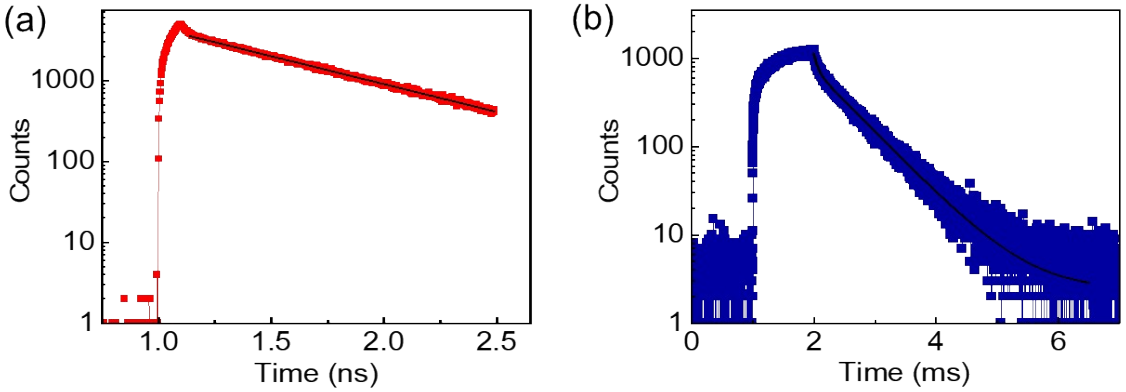

Figure S6. (a) Luminescence lifetime plots of (a) $Cs^{+}[Eu((+)\text{-}tfac)_4]^{-}$ and (d) $Rb^{+}[Eu((+)\text{-}tfac)_4]^{-}$ in chloroform.

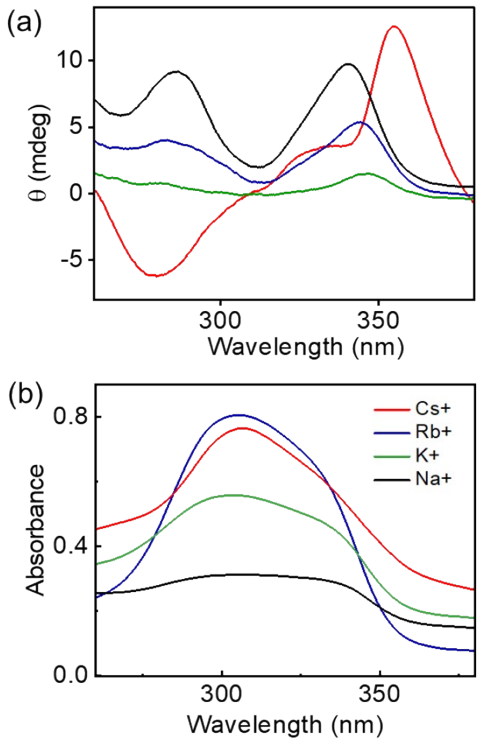

Figure S7. Solid state (a) CD and (b) absorption spectra of PMMA films of the $M^{+}[Eu(tfac)_4]^{-}$ complexes.

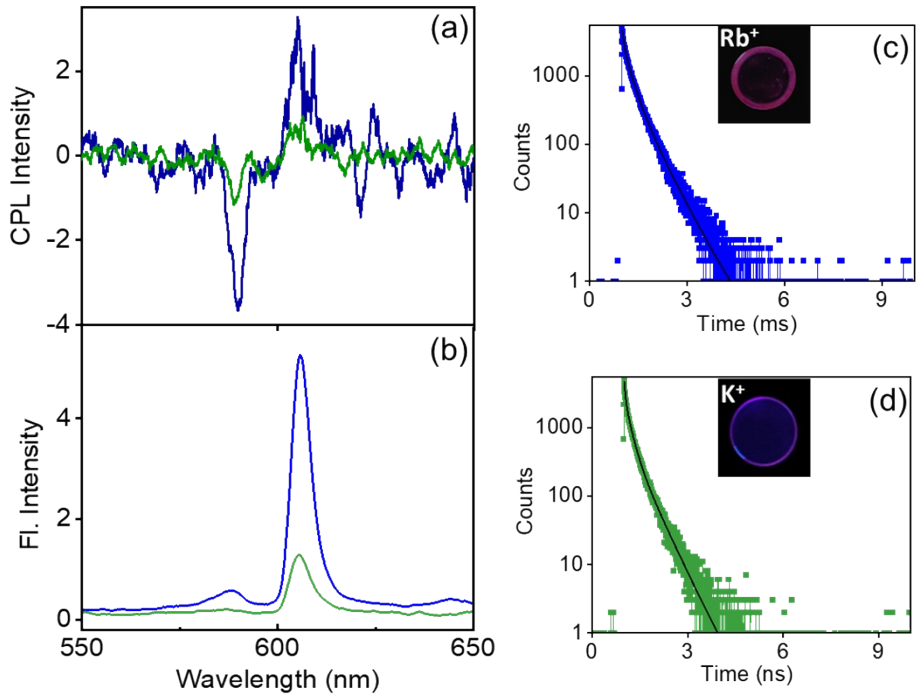

Figure S8. (a) CPL and (b) Fluorescence spectra of the $Rb^{+}[Eu((+)\text{-}tfac)_4]^{-}$ (blue traces) and $K^{+}[Eu((+)\text{-}tfac)_4]^{-}$ (green traces) embedded in the PMMA films. The luminescence lifetime plots of the PPMA films composed of (c) $Rb^{+}[Eu((+)\text{-}tfac)_4]^{-}$ and (d) $K^{+}[Eu((+)\text{-}tfac)_4]^{-}$.

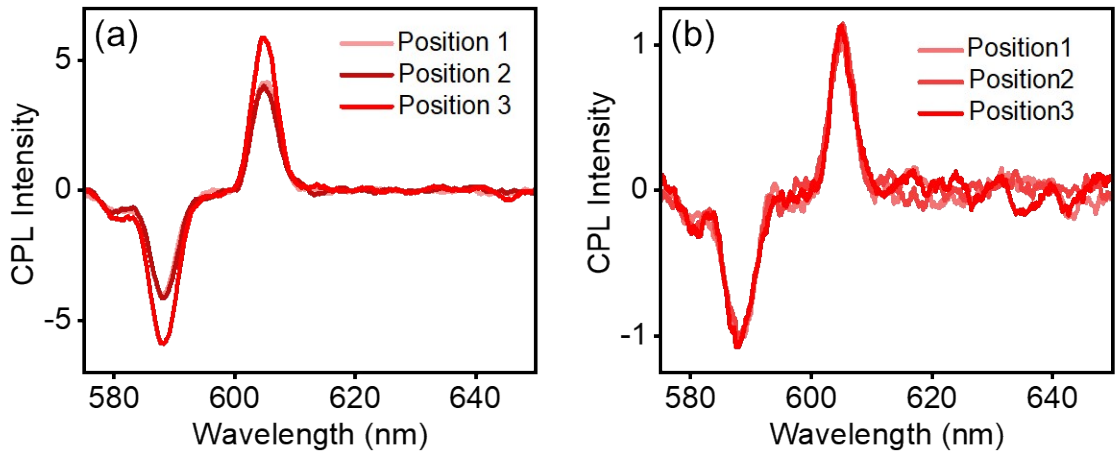

Figure S9. CPL spectra of $Cs^{+}[Eu((+)\text{-tfac})_4]^{-}$ collected from different points on the PMMA film prepared using a (a) 2.0 mM and (b) 1.0 mM solution of the complex in chloroform. Position 3 refers to the spectra collected after flipping the film.

Table S3. The g_{lum} values collected from different points on the PMMA films of $Cs^{+}[Eu(tfac)_4]^{-}$ complexes prepared using 2.0 mM and 1.0 mM solution in chloroform.

	PMMA (2.0 mM)		**PMMA (1.0 mM)**	
	g_{lum}**@595**	g_{lum}**@610**	g_{lum}**@595**	g_{lum}**@610**
Position 1	-0.290	0.031	-0.071	0.007
Position 2	-0.289	0.029	-0.070	0.007
Position 3	-0.280	0.028	-0.072	0.007

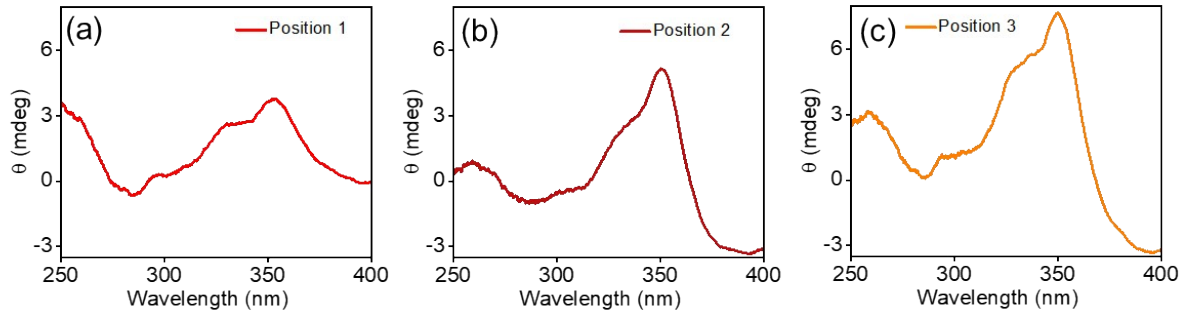

Figure S10. CD spectra of $Cs^{+}[Eu((+)\text{-tfac})_4]^{-}$ collected from different points after rotation and flipping of the PMMA film. Position 3 refers to spectra collected after flipping the film.

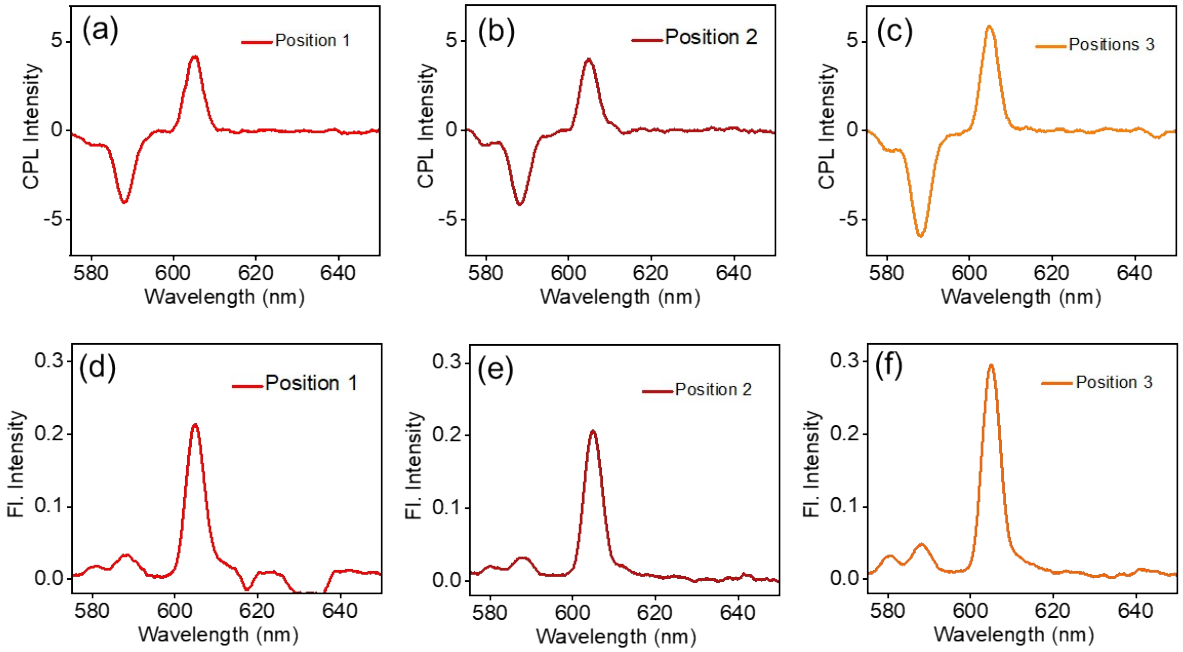

Figure S11. (a-c) CPL and (d-f) luminescence spectra of $Cs^{+}[Eu((+)\text{-tfac})_4]^{-}$ collected from different points after rotation and flipping of the PMMA film. Position 3 refers to the spectra collected after flipping the film.

Table S4. Chiral anisotropy values of $Cs^{+}[Eu((+)\text{-tfac})_4]^{-}$ PMMA film collected from different points on the film.

	g_{lum}@595	g_{lum}@610
Position 1	-0.290	0.031
Position 2	-0.289	0.029
Position 3	-0.280	0.028

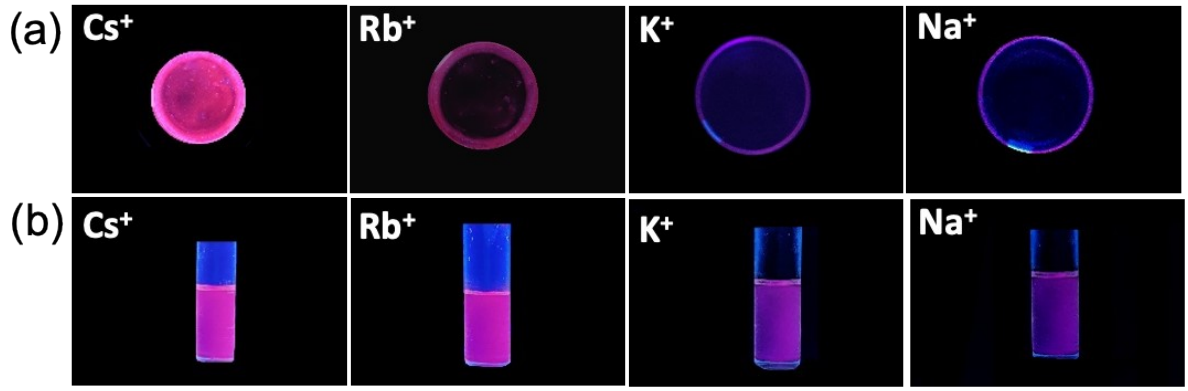

Figure S12. Photographic images of (a) solid films and (b) solution samples of $M^+[Eu((+)\text{-}tfac)_4]^-$ (M = Cs, Rb, K, Na) complexes in DMSO taken under 365 nm UV light.

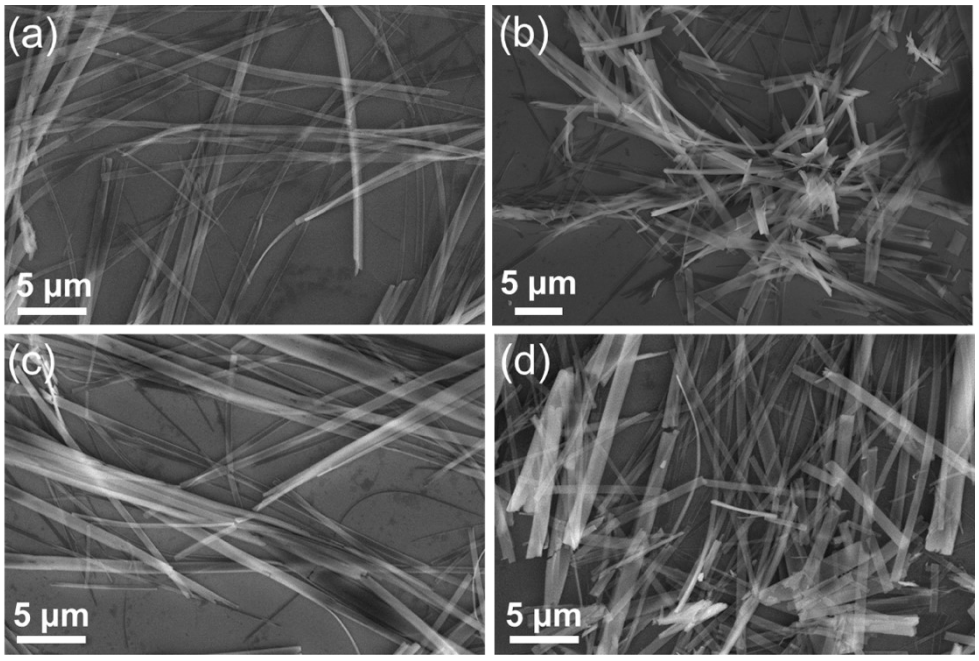

Figure S13. SEM images of nanostructures formed in DMSO solutions of (a) $Cs^+[Eu((+)\text{-}tfac)_4]^-$, (b) $Rb^+[Eu((+)\text{-}tfac)_4]^-$, $K^+[Eu((+)\text{-}tfac)_4]^-$ and $Na^+[Eu((+)\text{-}tfac)_4]^-$.

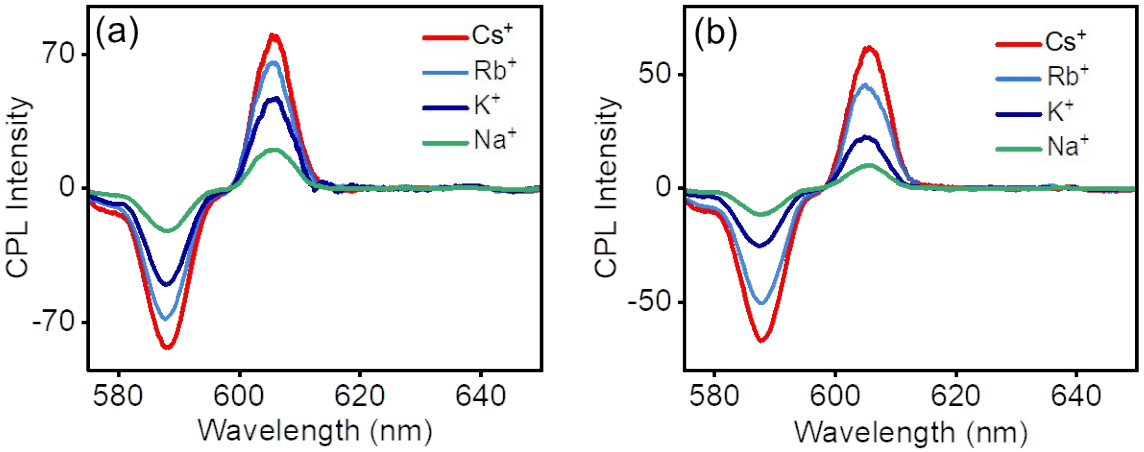

Figure S14. CPL spectra of (a) 2.0 mM and (b) 1.0 mM solution of the $M^{+}[Eu(tfac)_4]^{-}$ complexes (M = Cs, Rb, K, Na) in DMSO.

Table S5. The g_{lum} values of 2.0 mM and 1.0 mM solution the complexes in DMSO.

DMSO (2.0 mM)			DMSO (1.0 mM)		
M	g_{lum} ($^5D_0$ - $^7F_1$)	g_{lum} ($^5D_0$ - $^7F_2$)	**M**	g_{lum} ($^5D_0$ - $^7F_1$)	g_{lum} ($^5D_0$ - $^7F_2$)
Cs	-0.691	0.133	Cs	-0.518	-0.054
Rb	-0.565	0.054	Rb	-0.483	-0.047
K	-0.492	0.047	K	-0.465	-0.042
Na	-0.440	0.041	Na	-0.256	-0.024

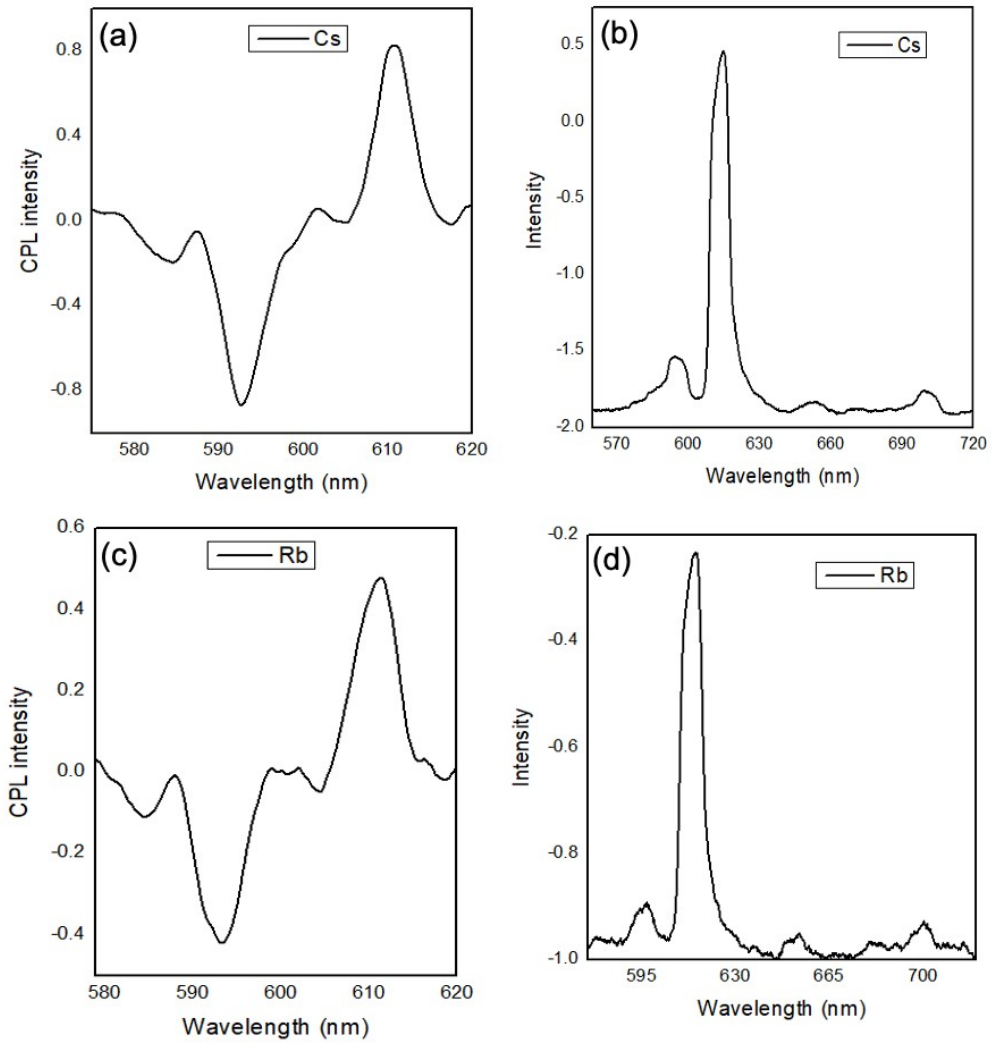

Figure S15. (a,c) CPL and (b,d) fluorescence spectra of (a,b) $Cs^{+}[Eu((+)\text{-tfac})_4]^{-}$ and (c,d) $Rb^{+}[Eu((+)\text{-tfac})_4]^{-}$ collected in DMSO:water (1:4) mixture.

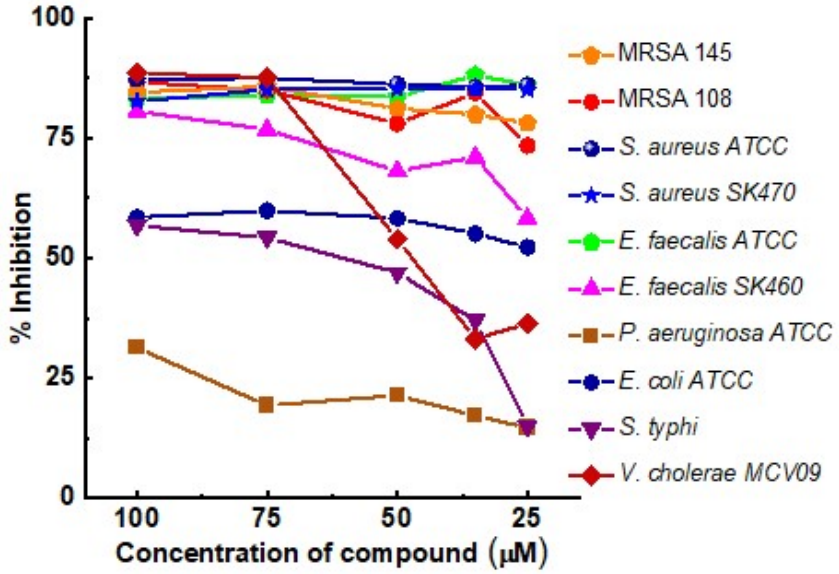

Figure S16. Percentage inhibition of $Rb^{+}[Eu((+)\text{-tfac})_4]^{-}$ compound against major Gram positive and Gram-negative pathogens.

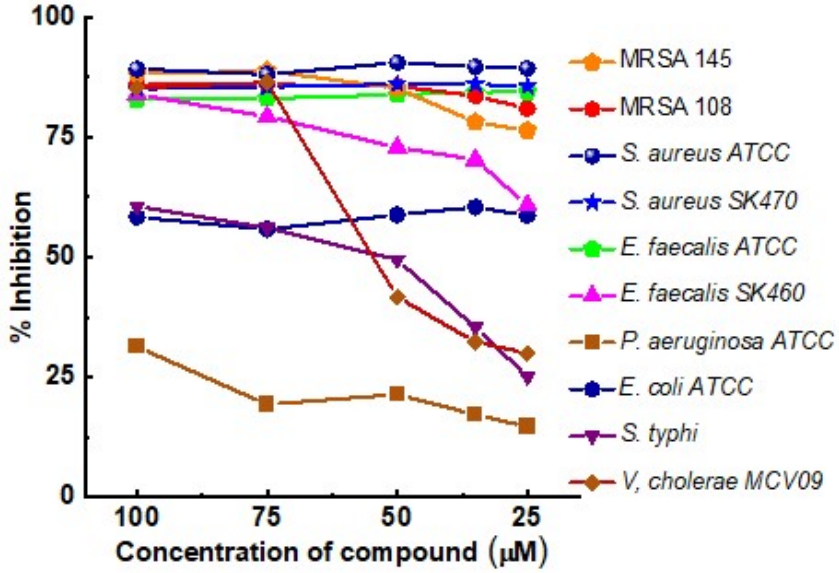

Figure S17. Percentage inhibition of $K^{+}[Eu((+)\text{-tfac})_4]^{-}$ compound against major Gram positive and Gram-negative pathogens.