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

Electronic Supplementary Information

Figure S1. The synthetic routes of complexes ***1-4***.

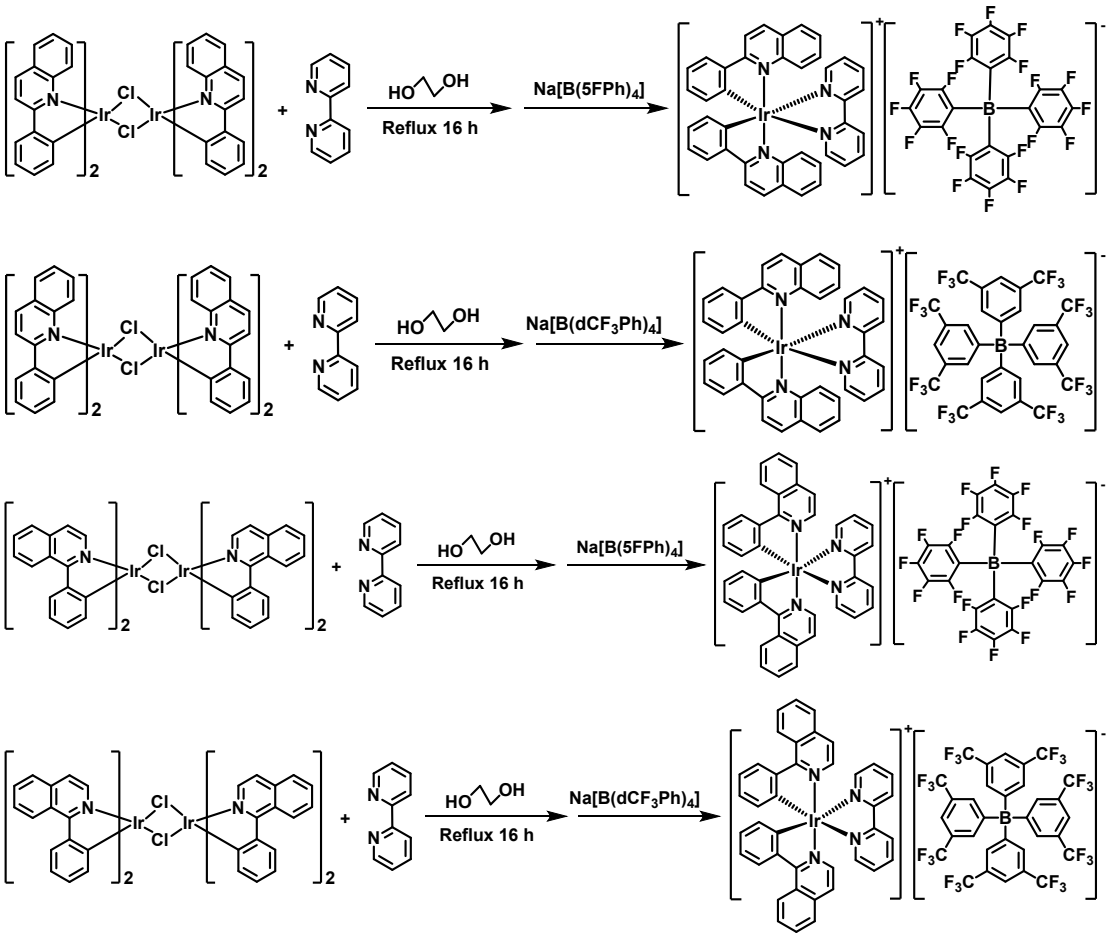

Figure S2. Schematic of the material design strategy.

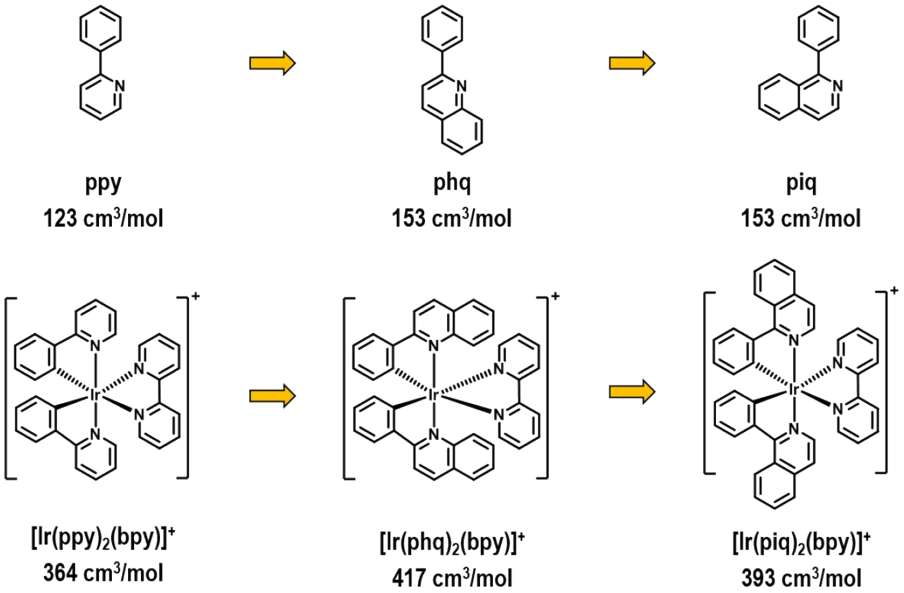

Figure S3. The excited state lifetimes of complexes ***1-4*** in neat films at room temperature.

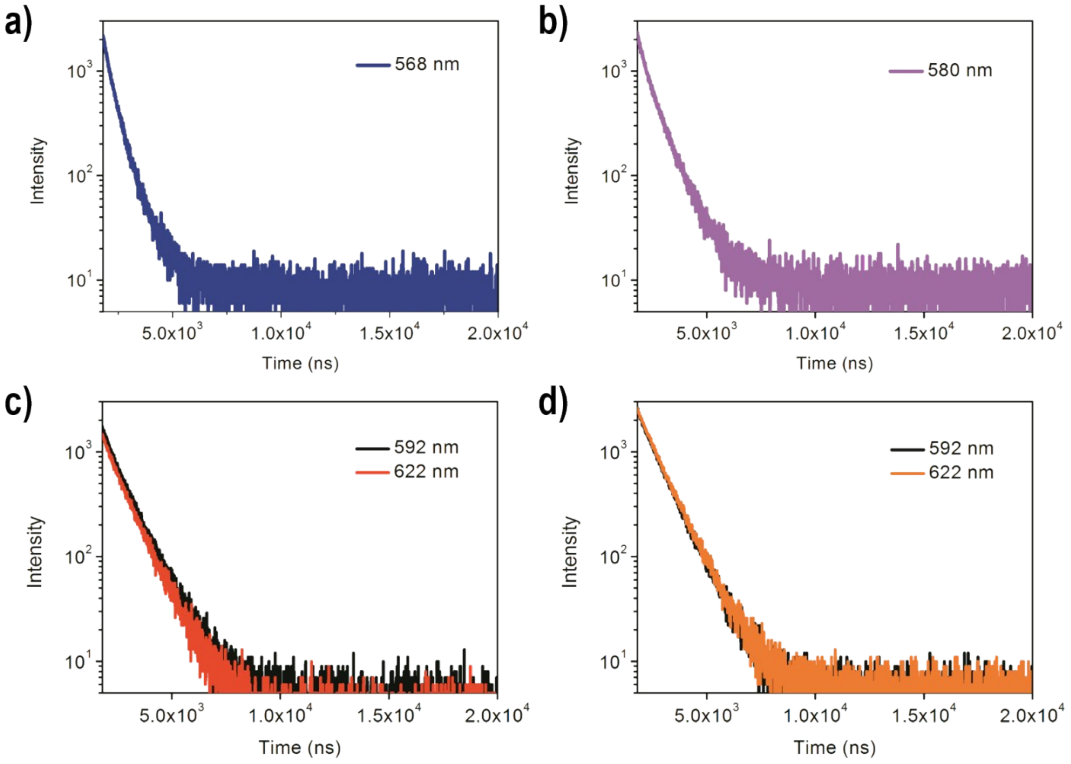

Figure S4. The excited state lifetimes of complexes ***1-4*** in acetonitrile glass at 77 K.

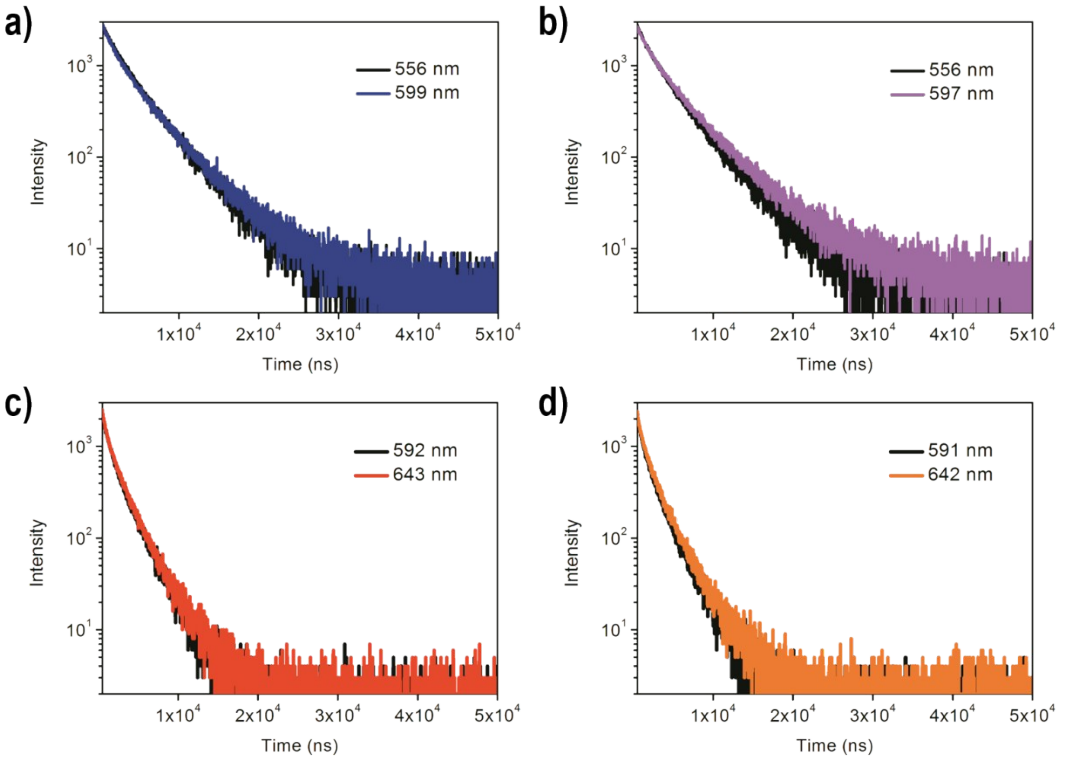

Figure S5. OLED characteristics. (a) *J*-*V*, (b) *L*-*V* and (c) CE-*L* characteristics, (d) EL spectra of ITO/ HATCN (5 nm)/ NPB (40 nm)/ TCTA (10 nm)/ DIC-TRZ: *x* % Complex ***1*** (12 nm)/ BPBiPA (50 nm)/ LiF (1 nm)/ Al (150 nm) with varying dopant concentrations.

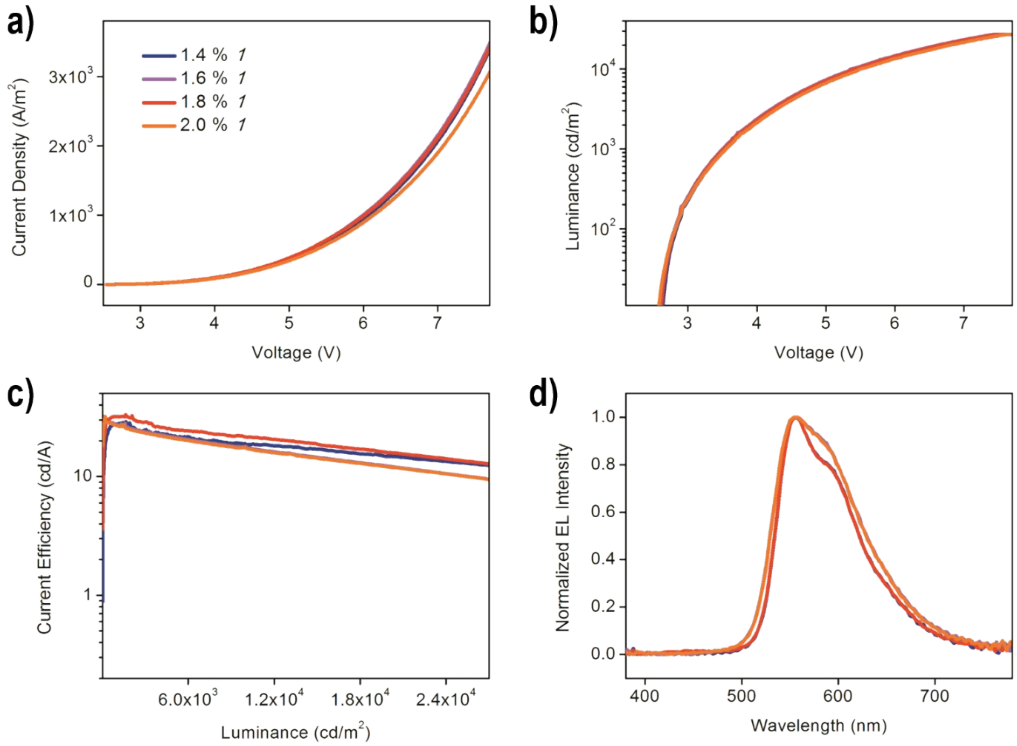

Figure S6. OLED characteristics. (a) *J*-*V*, (b) *L*-*V* and (c) CE-*L* characteristics, (d) EL spectra of ITO/ HATCN (5 nm)/ NPB (40 nm)/ TCTA (10 nm)/ DIC-TRZ: *x* % Complex ***2*** (12 nm)/ BPBiPA (50 nm)/ LiF (1 nm)/ Al (150 nm) with varying dopant concentrations.

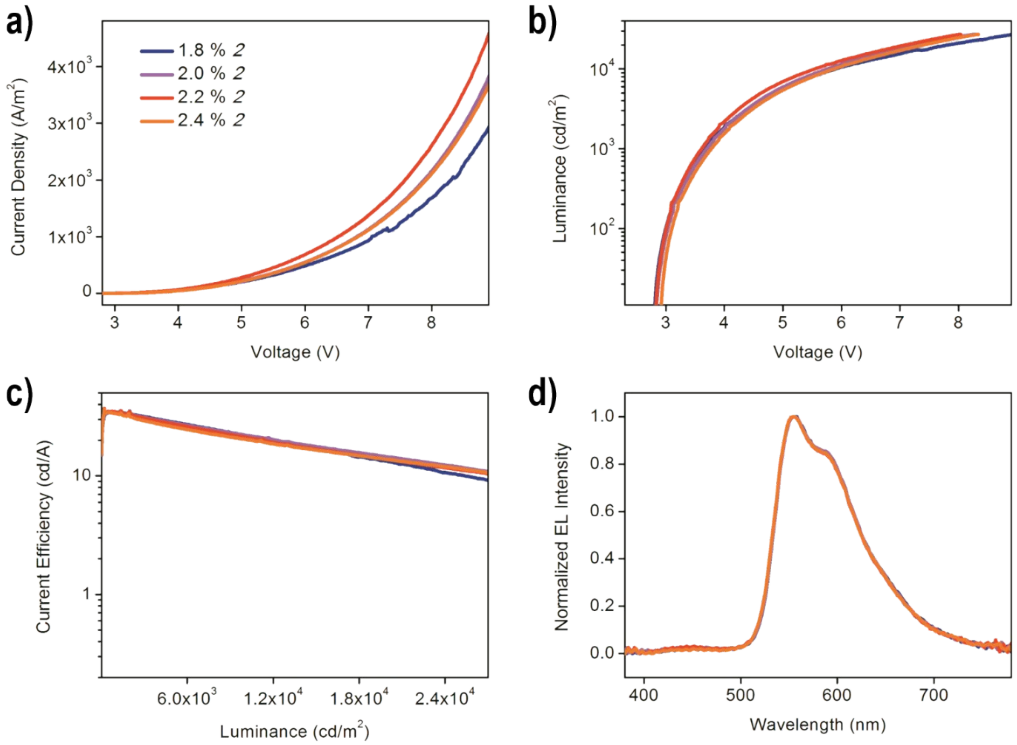

Figure S7. OLED characteristics. (a) *J*-*V*, (b) *L*-*V* and (c) CE-*L* characteristics, (d) EL spectra of ITO/ HATCN (5 nm)/ NPB (40 nm)/ TCTA (10 nm)/ DIC-TRZ: *x* % Complex ***3*** (12 nm)/ BPBiPA (50 nm)/ LiF (1 nm)/ Al (150 nm) with varying dopant concentrations.

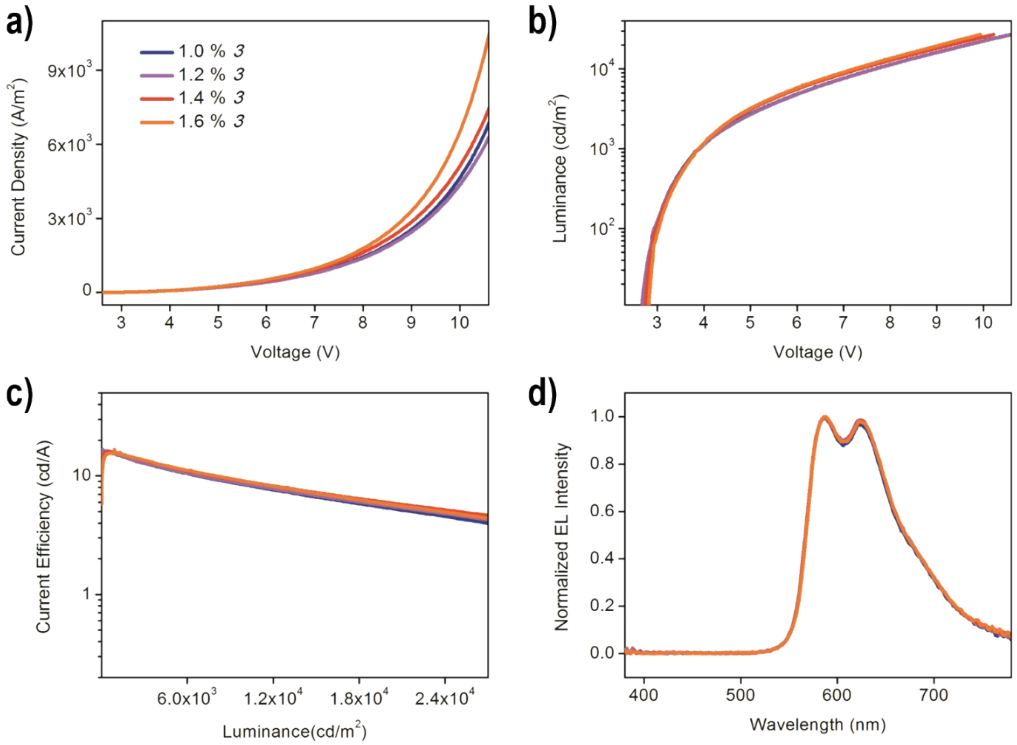

Figure S8. OLED characteristics. (a) *J*-*V*, (b) *L*-*V* and (c) CE-*L* characteristics, (d) EL spectra of ITO/ HATCN (5 nm)/ NPB (40 nm)/ TCTA (10 nm)/ DIC-TRZ: *x* % Complex ***4*** (12 nm)/ BPBiPA (50 nm)/ LiF (1 nm)/ Al (150 nm) with varying dopant concentrations.

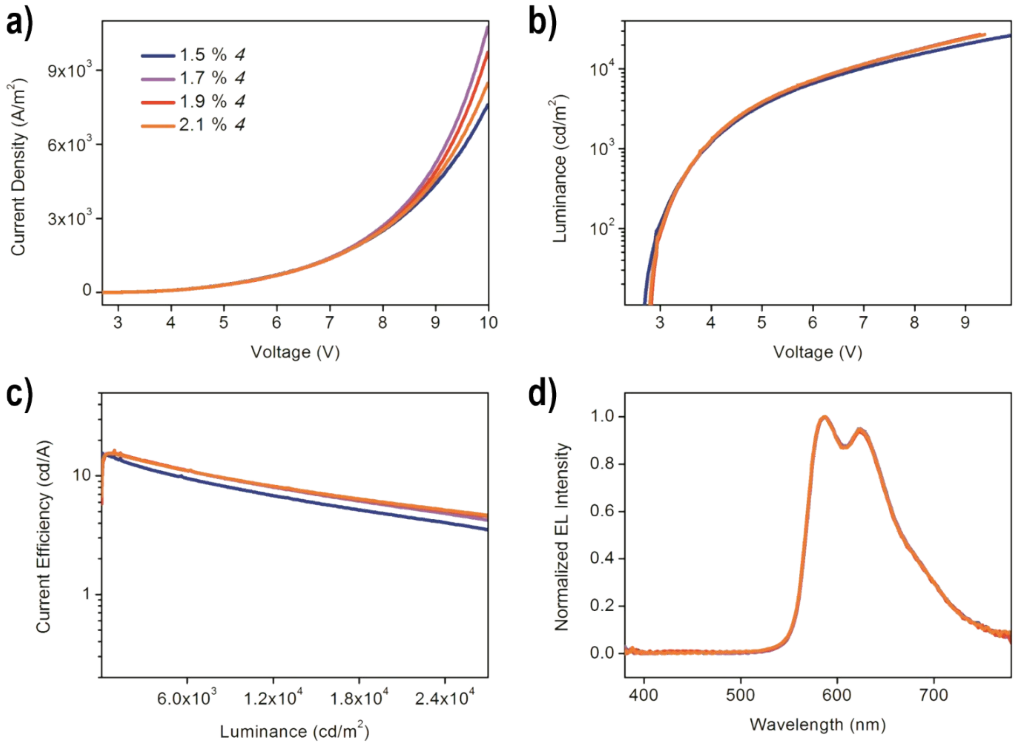

Table S1. Summary of the reported device performance of selected OLEDs based on cationic iridium(III) complexes.

Polychromic Dopant	V_{on}[a] [V]	Max CE[b] [cd/A]	Max EQE[c] [%]	Max PE[d] [lm/W]	Max L[e] [cd/m^2]	λ_{EL}[f] [nm]	CIE[g] (x, y)	Reference
$[Ir(dFppy)_2(pzpy)][PF_6]$	4.1	2.5	/	/	2.0×10^3	458	(0.16, 0.27)	6
$[Ir(dFppy)_2(dppmmi)][PF_6]$	7.2	3.4	/	/	7.3×10^2	478	(0.20, 0.38)	10
$[Ir(ppy)_2(Phpyim)][PF_6]$	4.4	25.3	8.1	/	38.5×10^3	526	(0.34, 0.56)	7
$[Ir(ppy)_2(EHCAF)][PF_6]$	8.4	23.7	6.8	5.3	11.9×10^3	540	(0.37, 0.58)	14
$[Ir(ppy)_2(bpy)][B(5FPh)_4]$	4.4	24.3	8.1	12.9	$>27.1\times10^3$	550	(0.42, 0.54)	15
$[Ir(L)_2(N^N)][PF_6]$	5.0	19.7	6.5	18.4	15.6×10^3	565	(0.44, 0.47)	13
$[Ir(phq)_2(bpy)][B(5FPh)_4]$	2.2	33.1	11.1	32.2	$>27.3\times10^3$	556, 591 (*sh*)	(0.47, 0.51)	This work
$[Ir(phq)_2(bpy)][B(dCF_3Ph)_4]$	2.5	37.0	13.7	37.5	$>27.3\times10^3$	560, 589 (*sh*)	(0.48, 0.51)	This work
$[Ir(piq)_2(bpy)][B(5FPh)_4]$	2.2	16.8	10.3	18.1	$>27.3\times10^3$	588, 624 (*sh*)	(0.59, 0.40)	This work
$[Ir(piq)_2(bpy)][B(dCF_3Ph)_4]$	2.4	16.4	9.9	14.2	$>27.3\times10^3$	588, 624 (*sh*)	(0.59, 0.40)	This work
$[Ir(npy)_2(c\text{-phen})][PF_6]$	6.8	10.0	7.1	/	3.2×10^3	618	(0.57, 0.40)	9
$[Ir(npy)_2(o\text{-phen})][PF_6]$	8.6	9.1	6.5	/	2.3×10^3	620	(0.57, 0.40)	9

[a] V_{on}, turn-on voltage (at the luminance of 1 cd/m^2). [b] CE, current efficiency. [c] EQE, external quantum efficiency. [d] PE, power efficiency. [e] L, luminance. [f] λ_{EL}, EL wavelength, *sh* denotes the shoulder wavelength. [g] CIE, Commission Internationale de l'Elairage.