

Supporting Information

Table S1. Main parameters of processing and refinement of the $(\text{Ca}_{(1-x)}\text{Sr}_{(x)})_9\text{Sc}(\text{PO}_4)_7:0.02\text{Eu}^{2+}$ samples

x	Phase	Weight (%)	Space group	Cell parameters ($^\circ$, Å), Cell volume ($\text{\AA}^3$)	R_{wp} , R_p (%), χ^2	R_B (%)
0	$\text{Ca}_9\text{Sc}(\text{PO}_4)_7:0.03\text{Eu}^{2+}$	97.01 (8)	$R3c$	$a = 10.4318$ (5) $c = 37.422$ (2) $V = 3526.7$ (6)	5.80, 4.22,	3.18
	Sc_2O_3	2.99 (8)	$Ia-3$	$a = 9.8416$ (7) $V = 953.2$ (2)	1.91	3.25
0.1	$\text{Ca}_{8.1}\text{Sr}_{0.9}\text{Sc}(\text{PO}_4)_7:0.03\text{Eu}^{2+}$	97.79 (6)	$R3c$	$a = 10.4221$ (4) $c = 37.378$ (2) $V = 3516.1$ (3)	4.94, 3.85,	2.26
	Sc_2O_3	2.21 (6)	$Ia-3$	$a = 9.8416$ (7) $V = 953.2$ (2)	1.64	4.32
0.2	$\text{Ca}_{7.2}\text{Sr}_{1.8}\text{Sc}(\text{PO}_4)_7:0.03\text{Eu}^{2+}$	98.29 (7)	$R3c$	$a = 10.4844$ (4) $c = 37.774$ (1) $V = 3595.9$ (3)	4.93, 3.62,	2.65
	Sc_2O_3	1.71 (7)	$Ia-3$	$a = 9.8400$ (1) $V = 952.8$ (3)	1.95	2.01
0.3	$\text{Ca}_{7.3}\text{Sr}_{2.7}\text{Sc}(\text{PO}_4)_7:0.03\text{Eu}^{2+}$	98.15 (9)	$R3c$	$a = 10.4960$ (5) $c = 38.084$ (2) $V = 3633.5$ (4)	4.74, 3.55,	2.42
	Sc_2O_3	1.85 (9)	$Ia-3$	$a = 9.838$ (1) $V = 952.1$ (4)	1.85	2.72
0.4	$\text{Ca}_{6.4}\text{Sr}_{3.6}\text{Sc}(\text{PO}_4)_7:0.03\text{Eu}^{2+}$	96.0 (7)	$R3c$	$a = 10.5194$ (3) $c = 38.391$ (1) $V = 3679.1$ (3)	4.43, 3.32,	2.78
	Sc_2O_3	4.0 (7)	$Ia-3$	$a = 9.8451$ (1)	1.78	1.49

				$V = 954.3$ (3)		
				$a = 10.5352$ (5)		
0.5	$\text{Ca}_{5.0}\text{Sr}_{5.0}\text{Sc}(\text{PO}_4)_7:0.03\text{Eu}^{2+}$	97.7 (1)	$R3c$	$c = 38.633$ (2)	5.28,	2.78
				$V = 3713.4$ (4)	3.89,	
	Sc_2O_3	2.3 (1)	$Ia-3$	$a = 9.837$ (1)	2.31	2.85
				$V = 951.9$ (3)		
				$a = 10.5518$ (2)		
0.6	$\text{Ca}_{3.6}\text{Sr}_{6.4}\text{Sc}(\text{PO}_4)_7:0.03\text{Eu}^{2+}$	96 (1)	$R3c$	$c = 38.8868$ (8)	5.24,	3.82
				$V = 3749.6$ (2)	3.74,	
	Sc_2O_3	4 (1)	$Ia-3$	$a = 9.835$ (2)	2.15	1.24
				$V = 951.3$ (6)		
				$a = 10.5727$ (2)		
0.7	$\text{Ca}_{2.7}\text{Sr}_{7.3}\text{Sc}(\text{PO}_4)_7:0.03\text{Eu}^{2+}$	96.9 (7)	$R3c$	$c = 39.1030$ (8)	4.72,	4.35
				$V = 3785.4$ (1)	3.45,	
	Sc_2O_3	3.1 (7)	$Ia-3$	$a = 9.88$ (3)	2.01	1.24
				$V = 964$ (10)		
				$a = 10.5976$ (2)		
0.8	$\text{Ca}_{1.8}\text{Sr}_{8.2}\text{Sc}(\text{PO}_4)_7:0.03\text{Eu}^{2+}$	96 (1)	$R3c$	$c = 39.3137$ (9)	6.41,	4.93
				$V = 3823.7$ (2)	4.48,	
	Sc_2O_3	4 (1)	$Ia-3$	$a = 9.829$ (3)	2.75	2.29
				$V = 949.7$ (8)		
				$a = 10.6420$ (4)		
0.9	$\text{Ca}_{0.9}\text{Sr}_{9.1}\text{Sc}(\text{PO}_4)_7:0.03\text{Eu}^{2+}$	96 (2)	$R3c$	$c = 39.488$ (1)	5.86,	2.27
				$V = 3873.0$ (3)	4.14,	
	Sc_2O_3	4 (2)	$Ia-3$	$a = 9.840$ (2)	2.57	1.32
				$V = 952.8$ (6)		
				$a = 10.6853$ (3)	4.25,	
1	$\text{Ca}_{0.9}\text{Sr}_{9.1}\text{Sc}(\text{PO}_4)_7:0.03\text{Eu}^{2+}$	91.5 (8)	$R3c$	$c = 39.597$ (1)	3.19,	2.92
				$V = 3915.3$ (3)	1.86	

Sc ₂ O ₃	3.7 (8)	<i>Ia-3</i>	$a = 9.844$ (2) $V = 954.1$ (5) $a = 5.3888$ (3)	0.79
Sr ₃ (PO ₄) ₂	4.8 (8)	<i>R-3m</i>	$c = 19.786$ (1) $V = 497.60$ (6)	2.58

Table S2. Fractional atomic coordinates and isotropic displacement parameters (Å²) of (Ca_(1-x)Sr_(x))₉Sc(PO₄)₇:0.03Eu²⁺

	<i>x</i>	<i>y</i>	<i>z</i>	<i>B</i> _{iso}	Occ.
<i>x</i> = 0					
Ca1	0.7228 (9)	0.8491 (12)	0.4314 (5)	1.6 (2)	1
Ca2	0.6213 (8)	0.8136 (12)	0.2318 (5)	1.46 (18)	1
Ca3	0.1268 (11)	0.2778 (7)	0.3247 (5)	2.2 (2)	1
Sc	0	0	0	3.4 (3)	1
P1	0	0	0.2677 (6)	1.29 (12)	1
P2	0.6803 (10)	0.8508 (17)	0.1333 (5)	1.29 (12)	1
P3	0.6488 (15)	0.8502 (14)	0.0320 (5)	1.29 (12)	1
O1	0	0	0.3121 (10)	2.54 (15)	1
O2	0.014 (2)	0.8706 (18)	0.2560 (8)	2.54 (15)	1
O3	0.722 (2)	0.905 (2)	0.1735 (8)	2.54 (15)	1
O4	0.752 (4)	0.774 (3)	0.1207 (9)	2.54 (15)	1
O5	0.730 (3)	0.008 (4)	0.1131 (9)	2.54 (15)	1
O6	0.515 (3)	0.759 (4)	0.1278 (10)	2.54 (15)	1
O7	0.608 (3)	0.949 (4)	0.0456 (11)	2.54 (15)	1
O8	0.577 (4)	0.696 (4)	0.0462 (10)	2.54 (15)	1
O9	0.831 (3)	0.922 (4)	0.0388 (10)	2.54 (15)	1
O10	0.6354 (18)	0.821 (3)	0.9915 (7)	2.54 (15)	1
<i>x</i> = 0.1					
Ca1	0.7216 (6)	0.8476 (8)	0.4311 (3)	0.93 (13)	0.9
Sr1	0.7216 (6)	0.8476 (8)	0.4311 (3)	0.93 (13)	0.1
Ca2	0.6223 (6)	0.8146 (9)	0.2314 (3)	2.06 (14)	0.9
Sr2	0.6223 (6)	0.8146 (9)	0.2314 (3)	2.06 (14)	0.1
Ca3	0.1289 (8)	0.2784 (5)	0.3252 (3)	1.60 (12)	0.9
Sr3	0.1289 (8)	0.2784 (5)	0.3252 (3)	1.60 (12)	0.1

Sc	0	0	0	0.89 (17)	1
P1	0	0	0.2681 (4)	0.62 (8)	1
P2	0.6826 (7)	0.8515 (12)	0.1333 (4)	0.62 (8)	1
P3	0.6492 (10)	0.8502 (10)	0.0316 (3)	0.62 (8)	1
O1	0	0	0.3095 (7)	1.46 (10)	1
O2	0.0131 (16)	0.8710 (14)	0.2562 (6)	1.46 (10)	1
O3	0.7218 (17)	0.9079 (16)	0.1732 (6)	1.46 (10)	1
O4	0.750 (3)	0.775 (3)	0.1210 (6)	1.46 (10)	1
O5	0.732 (3)	0.008 (3)	0.1132 (6)	1.46 (10)	1
O6	0.516 (2)	0.763 (3)	0.1290 (7)	1.46 (10)	1
O7	0.606 (2)	0.948 (3)	0.0450 (7)	1.46 (10)	1
O8	0.577 (2)	0.691 (2)	0.0462 (7)	1.46 (10)	1
O9	0.8279 (19)	0.917 (3)	0.0403 (7)	1.46 (10)	1
O10	0.6307 (14)	0.818 (2)	0.9921 (5)	1.46 (10)	1
$x = 0.2$					
Ca1	0.7183 (7)	0.8518 (12)	0.4330 (5)	1.84 (15)	0.8
Sr1	0.7183 (7)	0.8518 (12)	0.4330 (5)	1.84 (15)	0.2
Ca2	0.6192 (7)	0.8166 (15)	0.2336 (4)	2.16 (18)	0.8
Sr2	0.6192 (7)	0.8166 (15)	0.2336 (4)	2.16 (18)	0.2
Ca3	0.1413 (11)	0.2932 (6)	0.3273 (5)	0.30 (11)	0.8
Sr3	0.1413 (11)	0.2932 (6)	0.3273 (5)	0.30 (11)	0.2
Sc	0	0	0	2.4 (3)	1
P1	0	0	0.2677 (6)	1.63 (13)	1
P2	0.6802 (8)	0.8502 (19)	0.1333 (5)	1.63 (13)	1
P3	0.6584 (14)	0.8502 (13)	0.0327 (5)	1.63 (13)	1
O1	0	0	0.3095 (9)	1.48 (14)	1
O2	0.013 (2)	0.8710 (17)	0.2562 (8)	1.48 (14)	1
O3	0.722 (2)	0.9059 (19)	0.1732 (8)	1.48 (14)	1
O4	0.750 (4)	0.775 (3)	0.1187 (8)	1.48 (14)	1
O5	0.736 (4)	-0.001 (3)	0.1132 (9)	1.48 (14)	1
O6	0.516 (2)	0.763 (4)	0.1284 (8)	1.48 (14)	1
O7	0.602 (3)	0.948 (3)	0.0459 (9)	1.48 (14)	1
O8	0.586 (3)	0.687 (4)	0.0462 (9)	1.48 (14)	1

O9	0.821 (2)	0.915 (4)	0.0387 (8)	1.48 (14)	1
O10	0.6362 (16)	0.818 (2)	0.9921 (7)	1.48 (14)	1
$x = 0.3$					
Ca1	0.7128 (8)	0.8486 (16)	0.4350 (6)	1.54 (18)	0.7
Sr1	0.7128 (8)	0.8486 (16)	0.4350 (6)	1.54 (18)	0.3
Ca2	0.6277 (8)	0.8190 (18)	0.2347 (6)	1.83 (19)	0.7
Sr2	0.6277 (8)	0.8190 (18)	0.2347 (6)	1.83 (19)	0.3
Ca3	0.1448 (15)	0.2962 (8)	0.3298 (7)	0.59 (16)	0.7
Sr3	0.1448 (15)	0.2962 (8)	0.3298 (7)	0.59 (16)	0.3
Sc	0	0	0	1.9 (4)	1
P1	0	0	0.2677 (7)	1.75 (15)	1
P2	0.6849 (12)	0.850 (3)	0.1333 (7)	1.75 (15)	1
P3	0.658 (2)	0.8468 (19)	0.0327 (7)	1.75 (15)	1
O1	0	0	0.3095 (12)	0.60 (17)	1
O2	0.013 (3)	0.871 (2)	0.2562 (10)	0.60 (17)	1
O3	0.722 (3)	0.904 (2)	0.1732 (11)	0.60 (17)	1
O4	0.750 (5)	0.765 (4)	0.1184 (11)	0.60 (17)	1
O5	0.736 (5)	-0.001 (4)	0.1132 (12)	0.60 (17)	1
O6	0.516 (3)	0.768 (5)	0.1304 (11)	0.60 (17)	1
O7	0.611 (4)	0.948 (4)	0.0459 (11)	0.60 (17)	1
O8	0.586 (4)	0.687 (4)	0.0462 (11)	0.60 (17)	1
O9	0.821 (3)	0.915 (5)	0.0393 (10)	0.60 (17)	1
O10	0.632 (2)	0.818 (4)	0.9921 (10)	0.60 (17)	1
$x = 0.4$					
Ca1	0.7098 (7)	0.8546 (17)	0.4348 (6)	0.30 (14)	0.6
Sr1	0.7098 (7)	0.8546 (17)	0.4348 (6)	0.30 (14)	0.4
Ca2	0.6302 (8)	0.816 (2)	0.2346 (6)	0.30 (14)	0.6
Sr2	0.6302 (8)	0.816 (2)	0.2346 (6)	0.30 (14)	0.4
Ca3	0.1475 (19)	0.2988 (8)	0.3300 (7)	0.30 (15)	0.6
Sr3	0.1475 (19)	0.2988 (8)	0.3300 (7)	0.30 (15)	0.4
Sc	0	0	0	0.5 (3)	1
P1	0	0	0.2677 (7)	0.55 (15)	1
P2	0.6839 (12)	0.850 (3)	0.1336 (7)	0.55 (15)	1
P3	0.658 (2)	0.848 (2)	0.0327 (7)	0.55 (15)	1

O1	0	0	0.3107 (13)	0.50 (18)	1
O2	0.018 (3)	0.871 (3)	0.2562 (11)	0.50 (18)	1
O3	0.731 (3)	0.904 (3)	0.1732 (11)	0.50 (18)	1
O4	0.760 (5)	0.767 (5)	0.1184 (12)	0.50 (18)	1
O5	0.736 (5)	-0.001 (4)	0.1132 (12)	0.50 (18)	1
O6	0.516 (3)	0.759 (7)	0.1289 (11)	0.50 (18)	1
O7	0.607 (5)	0.948 (5)	0.0459 (12)	0.50 (18)	1
O8	0.586 (4)	0.687 (4)	0.0462 (12)	0.50 (18)	1
O9	0.822 (3)	0.915 (6)	0.0387 (11)	0.50 (18)	1
O10	0.636 (2)	0.818 (5)	0.9920 (10)	0.50 (18)	1
$x = 0.5$					
Ca1	0.7128 (6)	0.8537 (17)	0.4350 (6)	1.54 (15)	0.5
Sr1	0.7128 (6)	0.8537 (17)	0.4350 (6)	1.54 (15)	0.5
Ca2	0.6350 (7)	0.8183 (16)	0.2334 (5)	1.39 (14)	0.5
Sr2	0.6350 (7)	0.8183 (16)	0.2334 (5)	1.39 (14)	0.5
Ca3	0.1469 (16)	0.2967 (7)	0.3304 (6)	0.79 (13)	0.5
Sr3	0.1469 (16)	0.2967 (7)	0.3304 (6)	0.79 (13)	0.5
Sc	0	0	0	2.0 (3)	1
P1	0	0	0.2677 (6)	1.29 (15)	1
P2	0.6847 (11)	0.850 (3)	0.1333 (7)	1.29 (15)	1
P3	0.6489 (18)	0.8460 (18)	0.0327 (7)	1.29 (15)	1
O1	0	0	0.3095 (12)	1.77 (17)	1
O2	0.019 (3)	0.871 (2)	0.2562 (10)	1.77 (17)	1
O3	0.731 (3)	0.904 (3)	0.1732 (10)	1.77 (17)	1
O4	0.750 (5)	0.766 (5)	0.1184 (11)	1.77 (17)	1
O5	0.735 (5)	-0.001 (4)	0.1132 (11)	1.77 (17)	1
O6	0.516 (3)	0.759 (8)	0.1299 (10)	1.77 (17)	1
O7	0.611 (4)	0.948 (4)	0.0457 (12)	1.77 (17)	1
O8	0.586 (4)	0.687 (4)	0.0462 (12)	1.77 (17)	1
O9	0.822 (3)	0.915 (6)	0.0390 (10)	1.77 (17)	1
O10	0.627 (2)	0.818 (4)	0.9921 (9)	1.77 (17)	1
$x = 0.6$					
Ca1	0.7080 (9)	0.852 (2)	0.4351 (7)	0.30 (16)	0.4

Sr1	0.7080 (9)	0.852 (2)	0.4351 (7)	0.30 (16)	0.6
Ca2	0.6330 (10)	0.817 (2)	0.2329 (7)	0.81 (16)	0.4
Sr2	0.6330 (10)	0.817 (2)	0.2329 (7)	0.81 (16)	0.6
Ca3	0.150 (2)	0.2967 (8)	0.3296 (8)	0.30 (15)	0.4
Sr3	0.150 (2)	0.2967 (8)	0.3296 (8)	0.30 (15)	0.6
Sc	0	0	0	0.5 (4)	1
P1	0	0	0.2677 (8)	0.8 (2)	1
P2	0.6897 (16)	0.850 (4)	0.1341 (9)	0.8 (2)	1
P3	0.649 (3)	0.848 (3)	0.0327 (9)	0.8 (2)	1
O1	0	0	0.3095 (16)	0.5 (2)	1
O2	0.023 (4)	0.867 (3)	0.2562 (13)	0.5 (2)	1
O3	0.731 (4)	0.904 (4)	0.1732 (13)	0.5 (2)	1
O4	0.760 (5)	0.765 (5)	0.1184 (15)	0.5 (2)	1
O5	0.726 (6)	0.002 (5)	0.1132 (14)	0.5 (2)	1
O6	0.506 (4)	0.759 (8)	0.1304 (13)	0.5 (2)	1
O7	0.611 (6)	0.948 (6)	0.0453 (17)	0.5 (2)	1
O8	0.586 (5)	0.687 (5)	0.0462 (16)	0.5 (2)	1
O9	0.824 (4)	0.915 (8)	0.0387 (13)	0.5 (2)	1
O10	0.627 (3)	0.818 (7)	0.9917 (12)	0.5 (2)	1

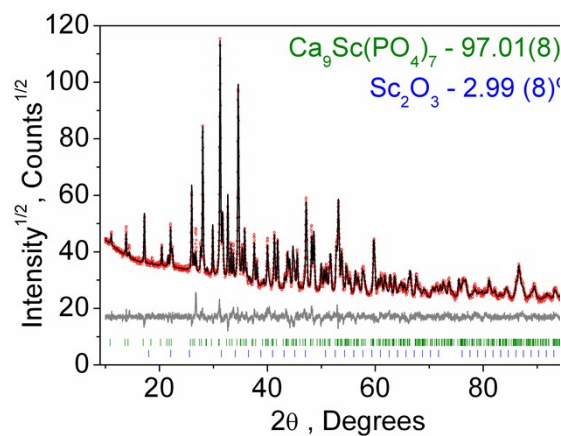
$x = 0.7$

Ca1	0.7102 (10)	0.853 (2)	0.4374 (7)	3.0 (3)	0.3
Sr1	0.7102 (10)	0.853 (2)	0.4374 (7)	3.0 (3)	0.7
Ca2	0.6354 (10)	0.819 (2)	0.2339 (7)	1.8 (2)	0.3
Sr2	0.6354 (10)	0.819 (2)	0.2339 (7)	1.8 (2)	0.7
Ca3	0.149 (2)	0.2944 (9)	0.3320 (8)	1.4 (2)	0.3
Sr3	0.149 (2)	0.2944 (9)	0.3320 (8)	1.4 (2)	0.7
Sc	0	0	0	0.7 (5)	1
P1	0	0	0.2664 (8)	2.3 (2)	1
P2	0.6850 (17)	0.846 (5)	0.1331 (9)	2.3 (2)	1
P3	0.654 (3)	0.836 (4)	0.0340 (10)	2.3 (2)	1
O1	0	0	0.3082 (15)	0.5 (2)	1
O2	0.027 (4)	0.863 (3)	0.2575 (14)	0.5 (2)	1
O3	0.736 (4)	0.918 (3)	0.1719 (14)	0.5 (2)	1

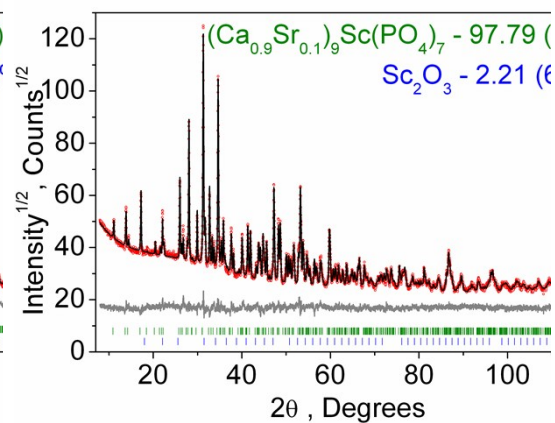
O4	0.762 (5)	0.770 (5)	0.1171 (16)	0.5 (2)	1
O5	0.721 (6)	-0.006 (4)	0.1145 (16)	0.5 (2)	1
O6	0.515 (4)	0.755 (9)	0.1317 (12)	0.5 (2)	1
O7	0.616 (6)	0.944 (6)	0.0472 (18)	0.5 (2)	1
O8	0.572 (5)	0.692 (5)	0.0475 (17)	0.5 (2)	1
O9	0.826 (4)	0.911 (8)	0.0374 (12)	0.5 (2)	1
O10	0.622 (3)	0.813 (6)	0.9934 (12)	0.5 (2)	1
$x = 0.8$					
Ca1	0.7041 (9)	0.852 (2)	0.4352 (8)	0.30 (15)	0.2
Sr1	0.7041 (9)	0.852 (2)	0.4352 (8)	0.30 (15)	0.8
Ca2	0.6356 (9)	0.817 (2)	0.2323 (8)	0.30 (16)	0.2
Sr2	0.6356 (9)	0.817 (2)	0.2323 (8)	0.30 (16)	0.8
Ca3	0.152 (2)	0.2996 (9)	0.3300 (8)	0.30 (15)	0.2
Sr3	0.152 (2)	0.2996 (9)	0.3300 (8)	0.30 (15)	0.8
Sc	0	0	0	0.5 (4)	1
P1	0	0	0.2677 (8)	0.50 (19)	1
P2	0.6897 (17)	0.850 (5)	0.1333 (10)	0.50 (19)	1
P3	0.650 (3)	0.841 (3)	0.0327 (9)	0.50 (19)	1
O1	0	0	0.3095 (16)	0.5 (2)	1
O2	0.023 (4)	0.871 (3)	0.2562 (14)	0.5 (2)	1
O3	0.731 (4)	0.904 (4)	0.1733 (14)	0.5 (2)	1
O4	0.760 (6)	0.765 (6)	0.1184 (18)	0.5 (2)	1
O5	0.735 (7)	0.007 (5)	0.1132 (16)	0.5 (2)	1
O6	0.506 (4)	0.759 (8)	0.1299 (13)	0.5 (2)	1
O7	0.602 (6)	0.948 (7)	0.0459 (17)	0.5 (2)	1
O8	0.586 (6)	0.687 (5)	0.0462 (18)	0.5 (2)	1
O9	0.831 (5)	0.915 (8)	0.0387 (13)	0.5 (2)	1
O10	0.627 (3)	0.818 (7)	0.9895 (13)	0.5 (2)	1
$x = 0.9$					
Ca1	0.7069 (10)	0.8476 (19)	0.4368 (10)	1.7 (2)	0.1
Sr1	0.7069 (10)	0.8476 (19)	0.4368 (10)	1.7 (2)	0.9
Ca2	0.6353 (9)	0.8186 (18)	0.2342 (9)	1.12 (19)	0.1
Sr2	0.6353 (9)	0.8186 (18)	0.2342 (9)	1.12 (19)	0.9

Ca3	0.1551 (15)	0.2935 (9)	0.3316 (10)	1.06 (18)	0.1
Sr3	0.1551 (15)	0.2935 (9)	0.3316 (10)	1.06 (18)	0.9
Sc	0	0	0	3.4 (7)	1
P1	0	0	0.2665 (10)	1.1 (2)	1
P2	0.6868 (17)	0.846 (4)	0.1336 (11)	1.1 (2)	1
P3	0.644 (3)	0.846 (3)	0.0332 (12)	1.1 (2)	1
O1	0	0	0.3083 (17)	0.8 (3)	1
O2	0.027 (4)	0.870 (3)	0.2574 (15)	0.8 (3)	1
O3	0.736 (4)	0.909 (4)	0.1720 (16)	0.8 (3)	1
O4	0.755 (5)	0.766 (6)	0.1172 (17)	0.8 (3)	1
O5	0.721 (6)	-0.006 (5)	0.1144 (17)	0.8 (3)	1
O6	0.508 (4)	0.764 (7)	0.1316 (13)	0.8 (3)	1
O7	0.616 (6)	0.955 (6)	0.0471 (18)	0.8 (3)	1
O8	0.590 (5)	0.683 (5)	0.0474 (19)	0.8 (3)	1
O9	0.830 (4)	0.911 (7)	0.0375 (13)	0.8 (3)	1
O10	0.622 (4)	0.813 (7)	0.9933 (13)	0.8 (3)	1
$x = 1$					
Sr1	0.6998 (8)	0.8479 (17)	0.4347 (6)	1.31 (15)	1
Sr2	0.6310 (9)	0.8154 (15)	0.2326 (6)	1.73 (17)	1
Sr3	0.1511 (16)	0.2925 (7)	0.3287 (7)	1.54 (17)	1
Sc	0	0	0	0.5 (4)	1
P1	0	0	0.2677 (8)	1.5 (2)	1
P2	0.6826 (17)	0.860 (3)	0.1333 (9)	1.5 (2)	1
P3	0.649 (3)	0.841 (3)	0.0327 (8)	1.5 (2)	1
O1	0	0	0.3096 (14)	0.5 (2)	1
O2	0.023 (3)	0.871 (3)	0.2562 (12)	0.5 (2)	1
O3	0.722 (4)	0.904 (3)	0.1732 (12)	0.5 (2)	1
O4	0.760 (5)	0.765 (5)	0.1184 (15)	0.5 (2)	1
O5	0.735 (6)	0.006 (4)	0.1106 (13)	0.5 (2)	1
O6	0.506 (4)	0.759 (6)	0.1304 (11)	0.5 (2)	1
O7	0.611 (5)	0.948 (6)	0.0459 (16)	0.5 (2)	1
O8	0.586 (5)	0.687 (5)	0.0462 (16)	0.5 (2)	1
O9	0.823 (4)	0.915 (7)	0.0389 (11)	0.5 (2)	1

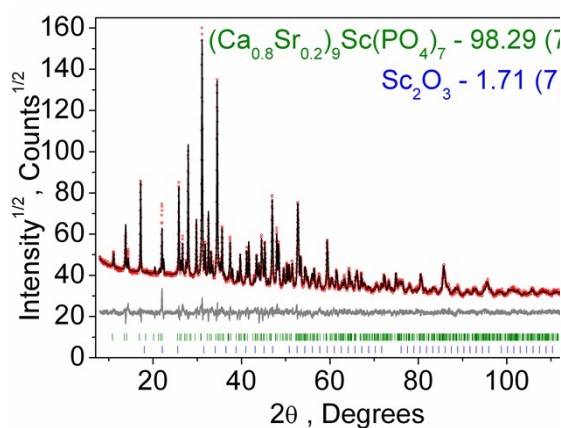
O10	0.627 (3)	0.818 (6)	0.9920 (11)	0.5 (2)	1
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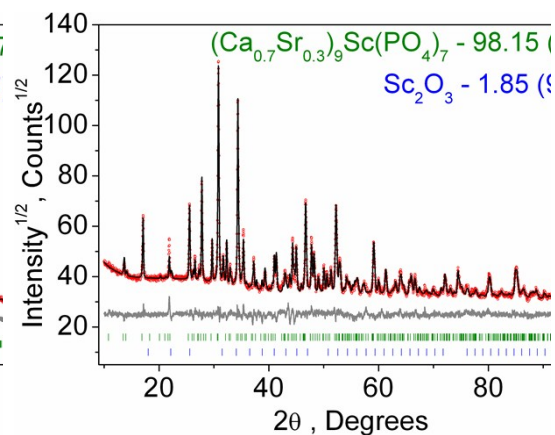
a)



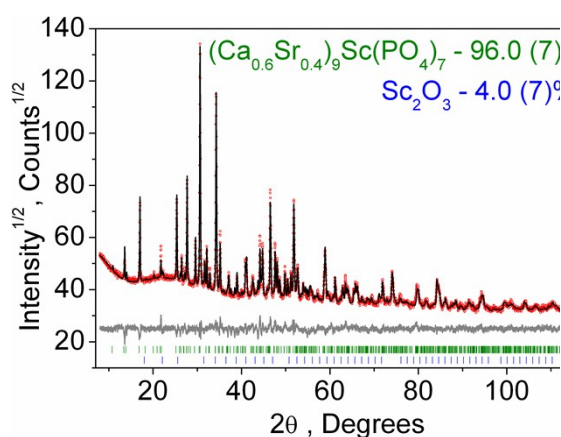
b)



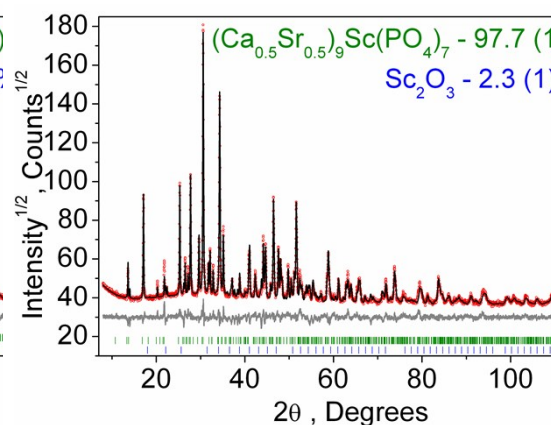
c)



d)



e)



f)

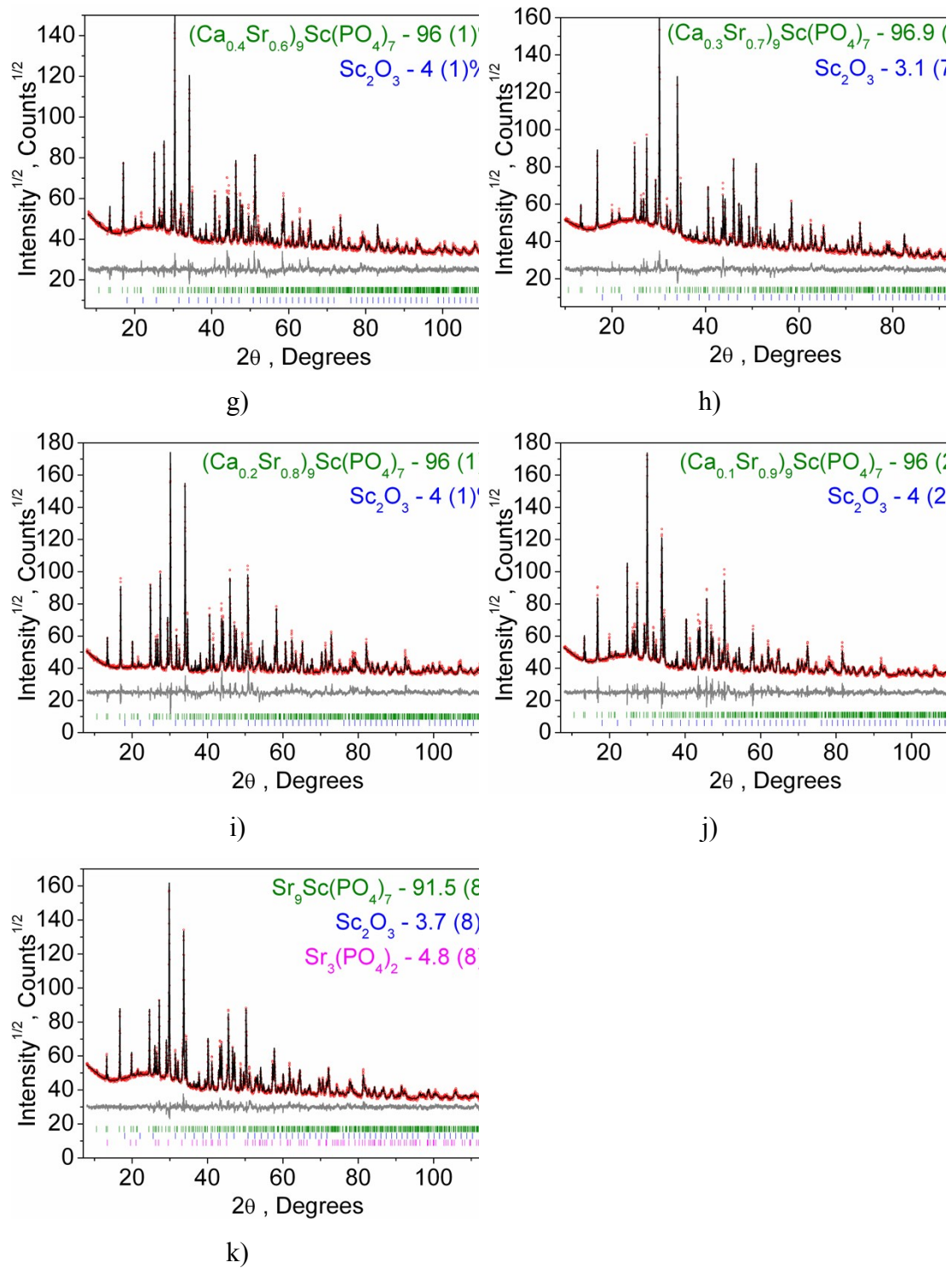


Figure S1. Difference Rietveld plot of $(\text{Ca}_{1-x}\text{Sr}_x)_9\text{Sc}(\text{PO}_4)_7:0.03\text{Eu}^{2+}$ with small amount of Sc_2O_3 , $\text{Sr}_3(\text{PO}_4)_2$ impurities: a) $x = 0$; b) $x = 0.1$; c) $x = 0.2$; d) $x = 0.3$; e) $x = 0.4$; f) $x = 0.5$; g) $x = 0.6$; h) $x = 0.7$; i) $x = 0.8$; j) $x = 0.9$; k) $x = 1$.

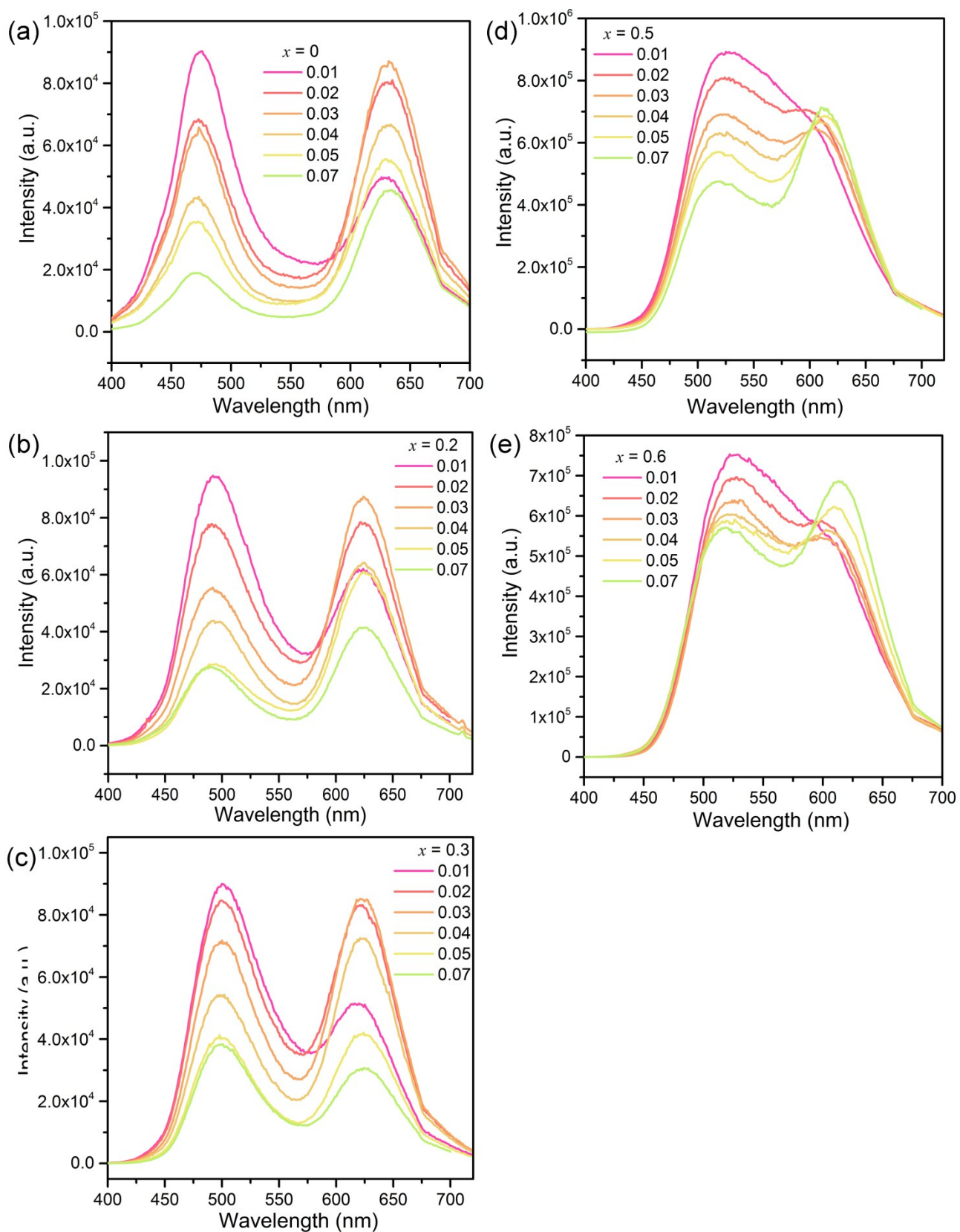


Figure S2. The emission spectra of the samples of the CSSPO: Eu²⁺, Mn²⁺

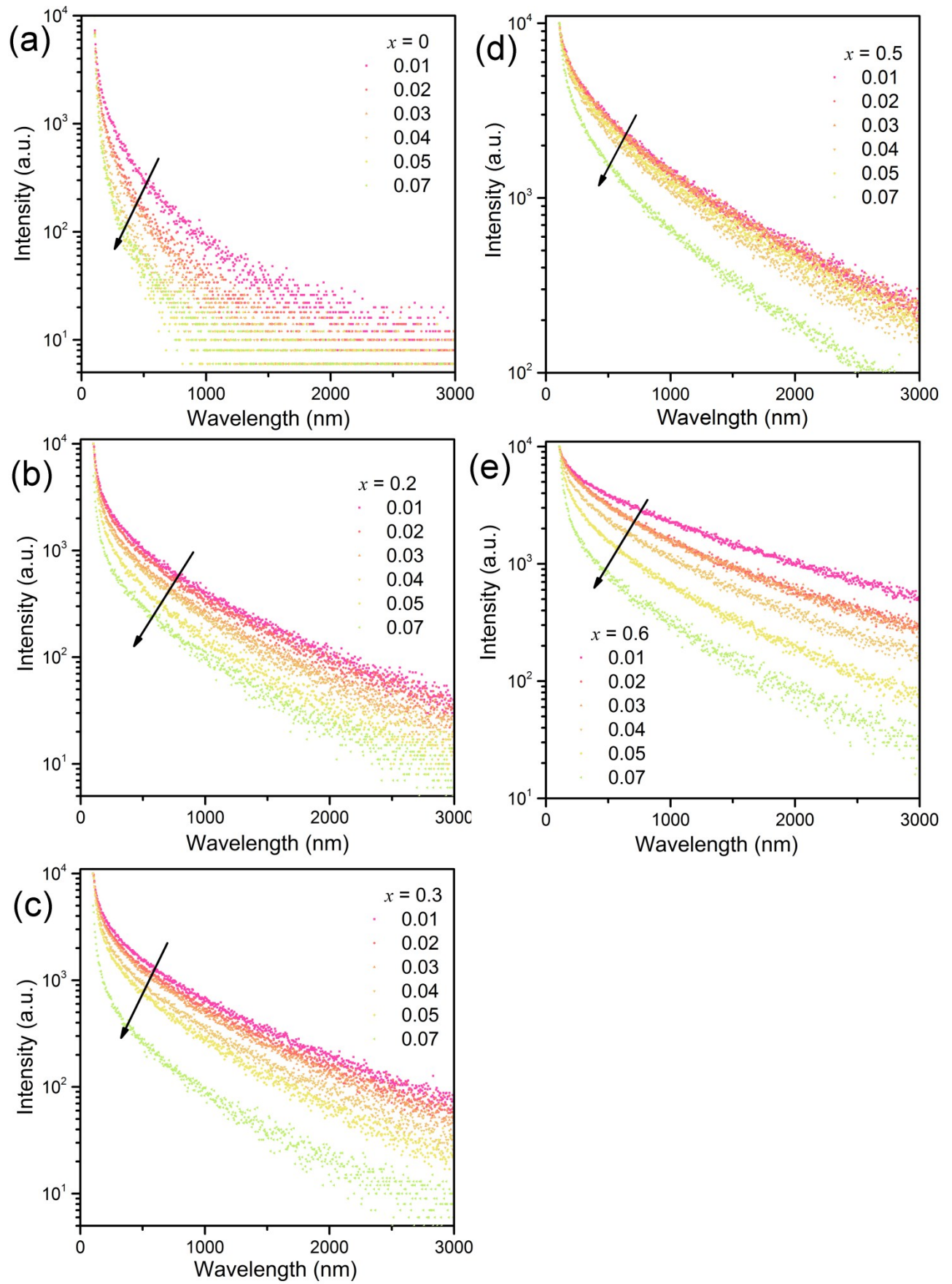


Figure S3. The decay curves of the samples of the CSSPO: Eu^{2+} , Mn^{2+}

Table S2. The lifetimes of the phosphor CSSPO:Eu²⁺,Mn²⁺ correspond to the emission peak of the Eu²⁺ and the Mn²⁺, respectively.

Emission wavelength (x = 0)	484 nm	624 nm
0.01	9.2706	110.3287
0.02	8.2300	128.5546
0.03	7.4406	136.4040
0.04	6.9083	76.3831
0.05	6.1702	37.4393
0.07	6.0929	31.9247
Emission wavelength (x = 0.2)	495 nm	624 nm
0.01	72.4819	166.6564
0.02	46.8234	284.5286
0.03	30.2980	362.4353
0.04	25.5350	133.9267
0.05	16.9192	106.7350
0.07	11.2497	63.0107
Emission wavelength (x = 0.3)	500 nm	624 nm
0.01	139.2206	390.4287
0.02	123.5944	467.6052
0.03	116.5044	631.1886
0.04	58.4961	314.5119
0.05	35.8187	64.8102
0.07	20.3846	22.1004
Emission wavelength (x = 0.3)	500 nm	624 nm
0.01	139.2206	390.4287
0.02	123.5944	467.6052
0.03	116.5044	631.1886
0.04	58.4961	314.5119
0.05	35.8187	64.8102
0.07	20.3846	22.1004
Emission wavelength (x = 0.6)	524 nm	620 nm
0.01	760.2211	1068.5132
0.02	684.3760	1170.6688
0.03	618.5262	1019.1640
0.04	580.2944	1224.5801
0.05	350.9679	1311.2664
0.07	240.6776	59.4404