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

Table S1. Main parameters of processing and refinement of the samples

x	Phase	Weight (%)	Space group	Cell parameters (Å, °), V (Å^3)	R_{wp}, R_p (%), χ^2	R_B (%)
0	$Lu_3Al_5O_{12}$:Ce	100	*Ia*-3*d*	*a*=*b*=*c*=11.91363(5), 1690.95(2)	10.83, 7.83, 2.32	3.19
0.5	$Lu_3Mg_{0.5}Al_4Si_{0.5}O_{12}$:Ce	100	*Ia*-3*d*	*a*=*b*=*c*=11.93845(4), 1701.55(2)	7.60, 5.43, 1.62	1.41
1	$Lu_3MgAl_3SiO_{12}$:Ce	95(1)	*Ia*-3*d*	*a*=*b*=*c*=11.95989(4), 1710.73(2)	7.24, 5.00, 1.56	1.41
	Lu_2SiO_5	5(1)	*C*2/*c*	*a*=14.254(1), *b*=6.6573(6), *c*=10.313(1), *β*=122.106(7), 829.0(2)		3.48
1.5	$Lu_3Mg_{1.5}Al_2Si_{1.5}O_{12}$:Ce	95(1)	*Ia*-3*d*	*a*=*b*=*c*=11.97997(6), 1719.36(3)	8.18, 4.70, 1.74	1.38
	Lu_2SiO_5	5(1)	*C*2/*c*	*a*=14.251(1), *b*=6.64953(5), *c*=10.283(1), *β*=122.142(6), 825.1(1)		3.60
2	$Lu_3Mg_2AlSi_2O_{12}$:Ce	91.1(2)	*Ia*-3*d*	*a*=*b*=*c*=11.98599(6), 1721.95(3)	9.04, 4.72, 1.92	1.59
	Lu_2SiO_5	8.9(2)	*C*2/*c*	*a*=14.2346(4), *b*=6.6431(2), *c*=10.2655(4), *β*=122.127(2), 822.08(5)		5.64

Table S2. Fractional atomic coordinates and isotropic displacement parameters (Å^2) of samples

	x	*y*	*z*	B_{iso}	Occ.
$Lu_3Al_5O_{12}$:Ce					
Lu	0	1/4	1/8	0.62 (4)	0.99
Ce	0	1/4	1/8	0.62 (4)	0.01
Al1	0	1/4	3/8	0.52 (6)	1
Al2	0	0	0	0.43 (7)	1
O	-0.0304 (3)	0.0514 (3)	0.1489 (3)	0.44 (8)	1
$Lu_3Mg_{0.5}Al_4Si_{0.5}O_{12}$:Ce					
Lu	0	1/4	1/8	0.65 (3)	0.99
Ce	0	1/4	1/8	0.65 (3)	0.01
Al1	0	1/4	3/8	0.53 (4)	5/6
Si1	0	1/4	3/8	0.53 (4)	1/6
Al2	0	0	0	0.17 (5)	3/4
Mg2	0	0	0	0.17 (5)	1/4
O	-0.0309 (2)	0.0526 (2)	0.1512 (2)	0.62 (6)	1
$Lu_3MgAl_3SiO_{12}$:Ce					
Lu	0	1/4	1/8	0.67 (3)	0.99
Ce	0	1/4	1/8	0.67 (3)	0.01
Al1	0	1/4	3/8	0.48 (4)	2/3
Si1	0	1/4	3/8	0.48 (4)	1/3

Al2	0	0	0	0.19 (5)	1/2
Mg2	0	0	0	0.19 (5)	1/2
O	-0.0322 (2)	0.0537 (2)	0.1533 (2)	0.59 (6)	1
$Lu_3Mg_{1.5}Al_2Si_{1.5}O_{12}$:Ce					
Lu	0	1/4	1/8	0.67 (4)	0.99
Ce	0	1/4	1/8	0.67 (4)	0.01
Al1	0	1/4	3/8	0.49 (5)	1/2
Si1	0	1/4	3/8	0.49 (5)	1/2
Al2	0	0	0	0.16 (6)	1/4
Mg2	0	0	0	0.16 (6)	3/4
O	-0.0330 (3)	0.0548 (2)	0.1553 (2)	0.49 (7)	1
$Lu_3Mg_2AlSi_2O_{12}$:Ce					
Lu	0	1/4	1/8	0.68 (4)	0.99
Ce	0	1/4	1/8	0.68 (4)	0.01
Al1	0	1/4	3/8	0.39 (5)	1/3
Si1	0	1/4	3/8	0.39 (5)	2/3
Mg2	0	0	0	0.29 (7)	1
O	-0.0339 (3)	0.0559 (3)	0.1575 (3)	0.30 (8)	1

Table S3. Main bond lengths (Å) of samples

$Lu_3Al_5O_{12}$:Ce			
(Lu/Ce)—O	2.410 (4)	Al1—O^{ii}	1.760 (3)
(Lu/Ce)—O^{i}	2.292 (4)	Al2—O	1.911 (4)
$Lu_3Mg_{0.5}Al_4Si_{0.5}O_{12}$:Ce			
(Lu/Ce)—O	2.406 (3)	(Al1/Si1)—O^{ii}	1.746 (3)
(Lu/Ce)—O^{i}	2.291 (3)	(Al2/Mg2)—O	1.946 (3)
$Lu_3MgAl_3SiO_{12}$:Ce			
(Lu/Ce)—O	2.403 (3)	(Al1/Si1)—O^{ii}	1.727 (3)
(Lu/Ce)—O^{i}	2.299 (3)	(Al2/Mg2)—O	1.980 (3)
$Lu_3Mg_{1.5}Al_2Si_{1.5}O_{12}$:Ce			
(Lu/Ce)—O	2.399 (3)	(Al1/Si1)—O^{ii}	1.713 (3)
(Lu/Ce)—O^{i}	2.303 (3)	(Al2/Mg2)—O	2.012 (3)
$Lu_3Mg_2AlSi_2O_{12}$:Ce			
(Lu/Ce)—O	2.394 (4)	(Al1/Si1)—O^{ii}	1.694 (3)
(Lu/Ce)—O^{i}	2.303 (4)	(Al2/Mg2)—O	2.044 (4)

Symmetry codes: (i) -y, -z+1/2, x; (ii) -y, z, x+1/2.