Electronic Supplementary Material (ESI) for RSC Advances.

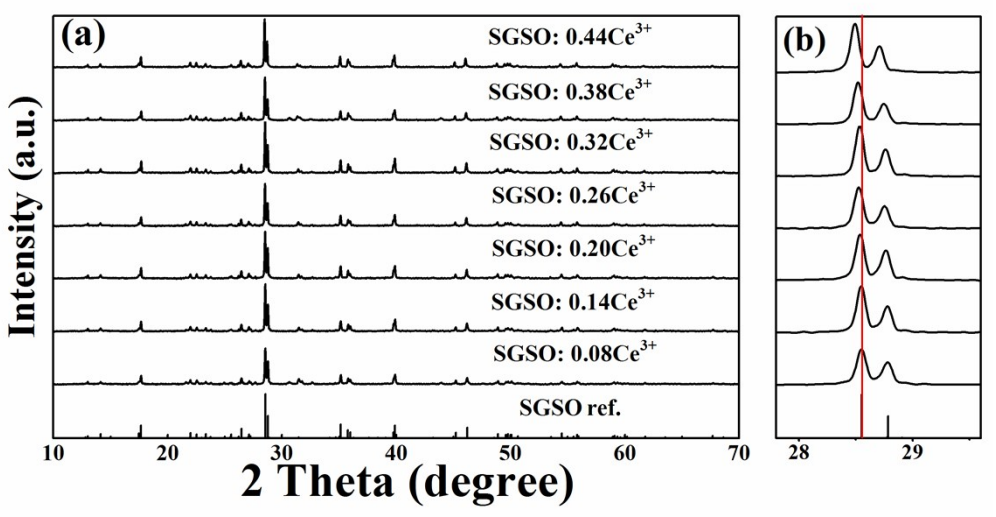

Fig. S1 (a) XRD patterns of SGSO:xCe^{3+} (x = 0.08, 0.14, 0.20, 0.26, 0.32, 0.38, 0.44). The $Sr_3Gd_2(Si_3O_9)_2$ phase reported by Tyutyunnik is shown as a reference.[29] (b) Partial enlarged details of XRD patterns of SGSO:xCe^{3+} (x = 0.08, 0.14, 0.20, 0.26, 0.32, 0.38, 0.44).

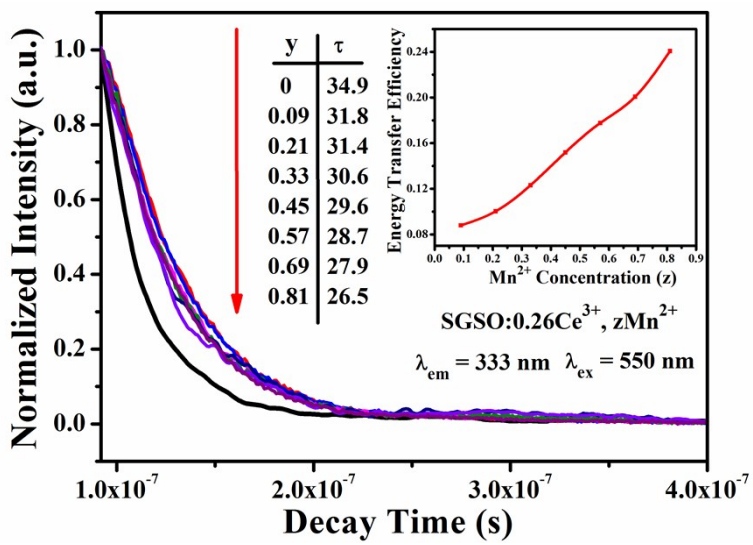

Fig. S2 Decay curves of Ce^{3+} emission monitored at 416 nm for SGSO:0.26Ce^{3+}, $z$$Mn^{2+}$ (z = 0, 0.09, 0.21, 0.33, 0.45, 0.57, 0.69, 0.81) under excitation at 348 nm. The inset shows the dependence of energy transfer efficiency (η_T) on the Mn^{2+} content.

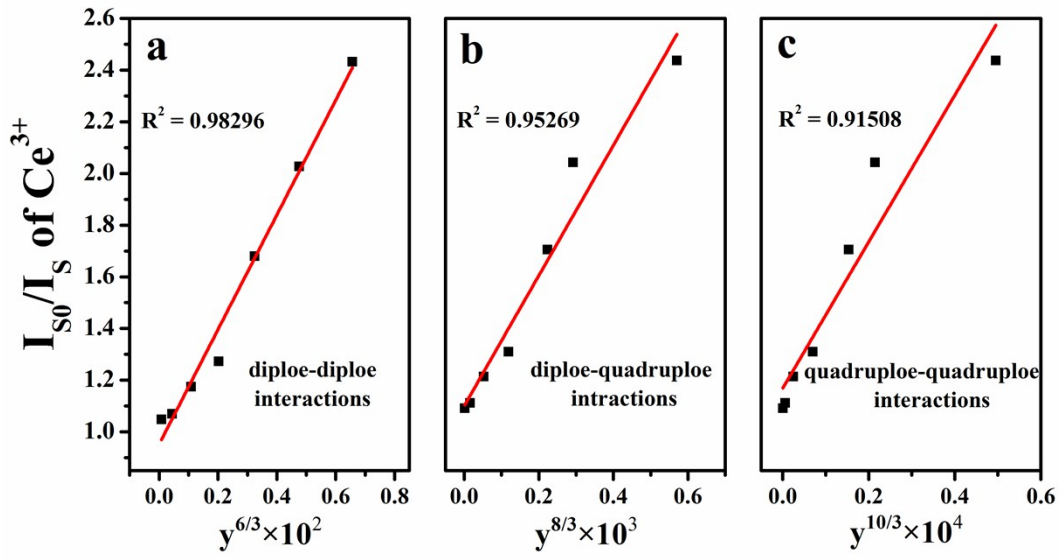

Fig. S3 Dependence of I_{S0}/I_S of Ce^{3+} in SGSO:0.26Ce^{3+}, $z$$Mn^{2+}$ (z = 0, 0.09, 0.21, 0.33, 0.45, 0.57, 0.69, 0.81) samples, (a) $z^{6/3}$, (b) $z^{8/3}$ and (c) $z^{10/3}$.

Table S1 All atom positions, occupation probability and thermal vibration parameters of SGSO:0.26Ce^{3+}, 0.60Tb^{3+} sample.

Atom	Wyckoff position	X	Y	Z	Bios.	Occ.
Sr1	8f	0.15966(0)	0.12390(0)	0.41185(0)	1.879(0)	0.661(0)
Gd1	8f	0.15966(0)	0.12390(0)	0.41185(0)	1.879(0)	0.339(0)
Sr2	8f	0.33893(0)	0.12980(0)	0.07935(0)	2.392(0)	0.710(0)
Gd2	8f	0.33893(0)	0.12980(0)	0.07935(0)	2.392(0)	0.290(0)
Sr3	4e	0.00000(0)	0.37830(0)	0.25000(0)	2.045(0)	0.130(0)
Gd3	4e	0.00000(0)	0.37830(0)	0.25000(0)	2.045(0)	0.370(0)
Si1	8f	0.09610(0)	0.06830(0)	0.10830(0)	3.316(0)	1.000(0)
Si2	8f	0.27330(0)	0.37200(0)	0.26540(0)	3.395(0)	1.000(0)
Si3	8f	0.40570(0)	0.17970(0)	0.40030(0)	2.978(0)	1.000(0)
O1	8f	0.01720(0)	0.18320(0)	0.13660(0)	3.316(0)	1.000(0)
O2	8f	0.05940(0)	0.11500(0)	0.58080(0)	3.066(0)	1.000(0)
O3	8f	0.16050(0)	0.38200(0)	0.29880(0)	1.285(0)	1.000(0)
O4	8f	0.17250(0)	0.09870(0)	0.01890(0)	1.263(0)	1.000(0)
O5	8f	0.16720(0)	0.04250(0)	0.18670(0)	2.628(0)	1.000(0)
O6	8f	0.30490(0)	0.37100(0)	0.17540(0)	1.263(0)	1.000(0)
O7	8f	0.31830(0)	0.21590(0)	0.31910(0)	1.816(0)	1.000(0)
O8	8f	0.34590(0)	0.09080(0)	0.49110(0)	1.342(0)	1.000(0)
O9	8f	0.50660(0)	0.07760(0)	0.13220(0)	1.421(0)	1.000(0)

Table S2 Selected interatomic distances of SGSO:0.26Ce^{3+}, 0.60Tb^{3+} sample.

Bond	Length (Å)	Bond	Length (Å)	Bond	Length (Å)
Sr1-O1	2. 56072(5)	Sr2-O3	2.69898(5)	Sr3-O1	2.32028(4)
Sr1-O2	2. 86542(7)	Sr2-O4	2.45523(5)	Sr3-O1	2.32028(4)
Sr1-O3	2. 67524(5)	Sr2-O4	2.63460(5)	Sr3-O3	2.30588(5)
Sr1-O4	2. 40739(4)	Sr2-O5	2.91071(6)	Sr3-O3	2.30588(5)
Sr1-O6	2. 45999(5)	Sr2-O6	2.45392(4)	Sr3-O9	2.38223(4)
Sr1-O7	2. 66141(5)	Sr2-O8	2.21106(4)	Sr3-O9	2.38223(4)
Sr1-O8	2. 81586(6)	Sr2-O9	2.45393(5)	Gd3-O1	2.32028(4)
Sr1-O8	2. 71309(5)	Gd2-O3	2.69898(5)	Gd3-O1	2.32028(4)
Gd1-O1	2. 56072(5)	Gd2-O4	2.45523(5)	Gd3-O3	2.30588(5)
Gd1-O2	2. 86542(7)	Gd2-O4	2.63460(5)	Gd3-O3	2.30588(5)
Gd1-O3	2. 67524(5)	Gd2-O5	2.91071(6)	Gd3-O9	2.38223(4)
Gd1-O4	2. 40739(4)	Gd2-O6	2.45392(4)	Gd3-O9	2.38223(4)
Gd1-O6	2. 45999(5)	Gd2-O8	2.21106(4)	——	——
Gd1-O7	2. 66141(5)	Gd2-O9	2.45393(5)	——	——
Gd1-O8	2. 81586(6)	——	——	——	——
Gd1-O8	2. 71309(5)	——	——	——	——
Sr1/ Gd1-O	2.64489	Sr2/ Gd2-O	2.54549	Sr3/ Gd3-O	2.33613

Table S3 The ionic radius (Å) of Sr^{2+}, Gd^{3+}, Ce^{3+}, Tb^{3+} and Mn^{2+} for the given coordination number (CN).

Ion	Sites	Ionic Radius(Å)		
		CN=8	CN=7	CN=6
Sr^{2+}	8f/4e	1.26	1.21	1.18
Gd^{3+}	8f/4e	1.05	1.00	0.94
Ce^{3+}	8f/4e	1.14	1.07	1.01
Tb^{3+}	8f/4e	1.04	0.98	0.92
Mn^{2+}	8f/4e	0.96	0.90	0.83