Supplementary Information

Surface plasmon assisted preparation of X1-type Y_2SiO_5:Eu^{3+}-Au luminescent crystal

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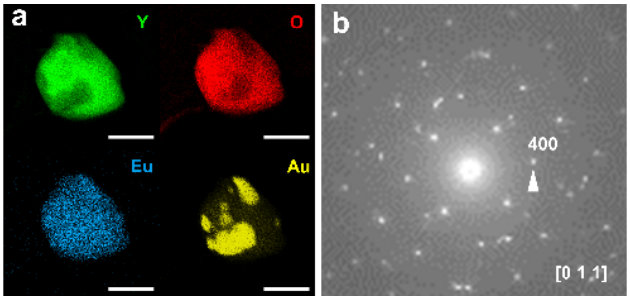

Fig. S1. (a) EDX elemental mapping analysis and (b) SAED pattern of the transformation product of the composite structure $NaYF_4$:Eu^{3+}@SiO_2(5 nm)@Au, and the scale bar is 200 nm in (a), SAED pattern of the particle after transformation is taken along [011] zone axes in (b).

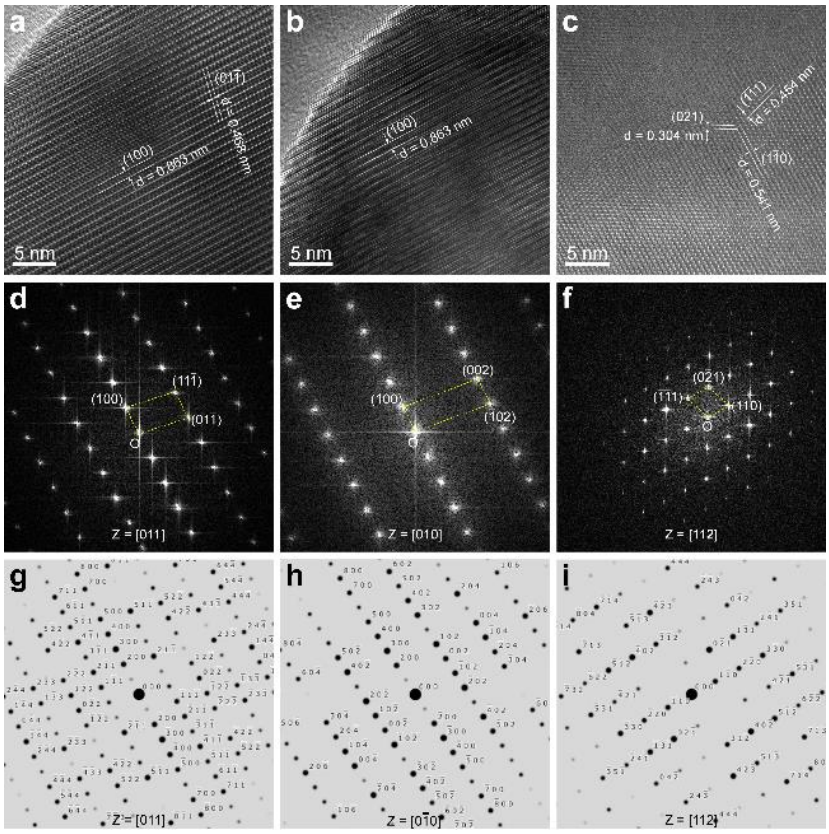

Fig. S2. HR-TEM images for the transformation product of the composite $NaYF_4$:Eu^{3+}@SiO_2(15 nm)@Au in Figure 3g (upper inset), acquired along (a) [011], (b) [0-10], and (c) [112] axis, respectively. Corresponding (d-f) FFT images and (g-i) simulations of electron diffraction patterns of X1-Y_2SiO_5 according to PDF-1 No.52-1810 standard card.

Map

Element	At. No.	Netto	Mass [%]	Mass Norm. [%]	Atom [%]	abs. error [%] (1 sigma)	rel. error [%] (1 sigma)
Yttrium	39	16179	58.75	58.75	25.42	1.86	3.16
Oxygen	8	32788	24.30	24.30	58.42	0.77	3.15
Silicon	14	16252	10.65	10.65	14.59	0.11	1.04
Gold	79	183	0.46	0.46	0.09	0.09	18.75
Europium	63	3772	5.83	5.83	1.48	0.62	10.68
		Sum	**100.00**	**100.00**	**100.00**		

Fig. S3. EDX elemental mapping analysis of the elements content in Figure 3j.

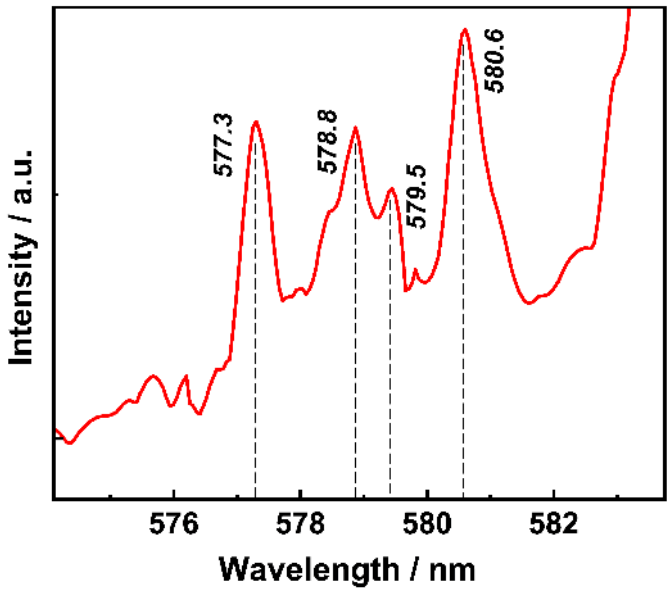

Fig. S4. Partial zoom-in luminescence spectrum of $^5D_0 \rightarrow {}^7F_0$ transitions of Eu^{3+} ions in the transformation product of the composite structure $NaYF_4$:Eu^{3+}@SiO_2(30 nm)@Au in Figure 3h.

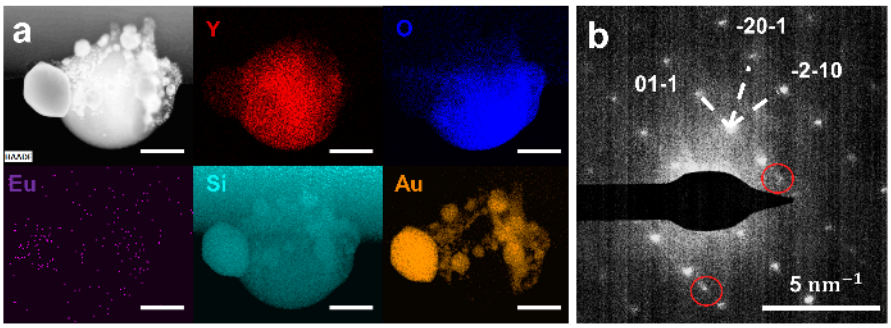

Fig. S5. (a) High angle annular dark-field (HAADF) scanning transmission electron microscopy (STEM) image, EDX elemental mapping analysis (scale bar is 200 nm) and (b) SAED pattern of the transformation product of the composite structure $NaYF_4$:Eu^{3+}@SiO_2(30 nm)@Au.

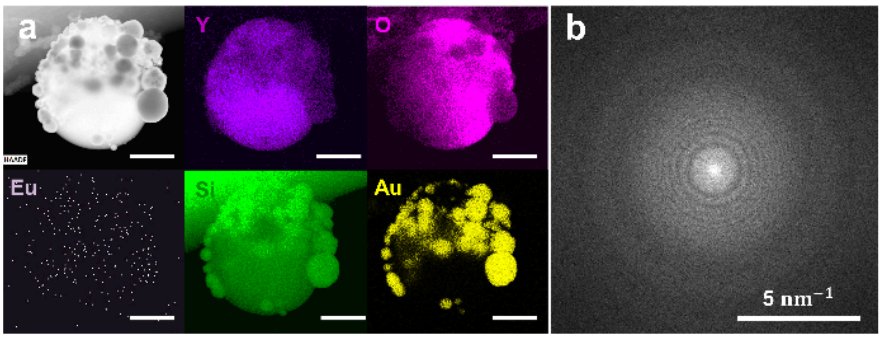

Fig. S6. (a) High angle annular dark-field (HAADF) scanning transmission electron microscopy (STEM) image, EDX elemental mapping analysis (scale bar is 200 nm) and (b) SAED pattern of the transformation product of the composite structure $NaYF_4:Eu^{3+}@SiO_2$(90 nm)@Au.

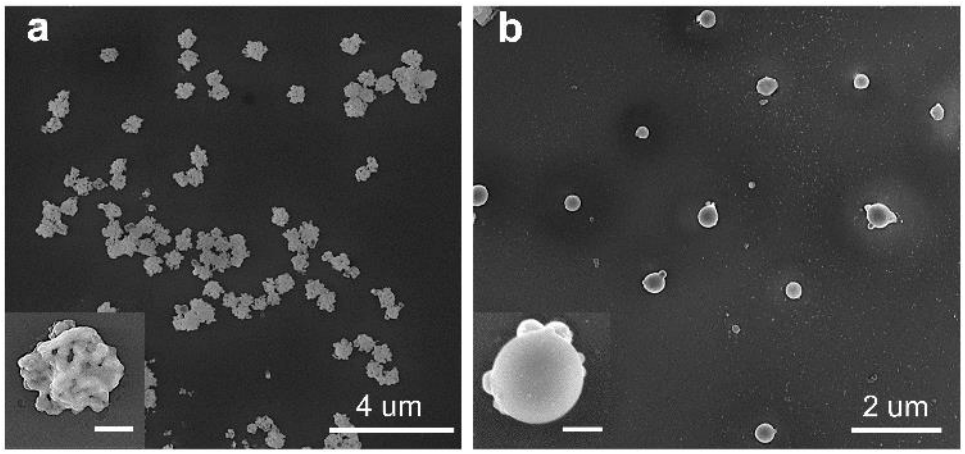

Fig. S7. SEM images of multiple $NaYF_4:Eu^{3+}@SiO_2$(15 nm)@Au particles and the corresponding single particle (Insets, scale bar is 200 nm) under (a) conventional annealing at 1050 °C for 1 h and (b) 532 nm CW laser irradiation.