016, 01, 18

$Y_2BaZnO_5:Er^{3+}$ microcapsules with enhanced upconversion by vanadium ion codoping

Hom Nath Luitel*, Rumi Chand, Toshio Torikai, Mitsunori Yada, Takanori Watari#

Supplementary information

Fig. S1

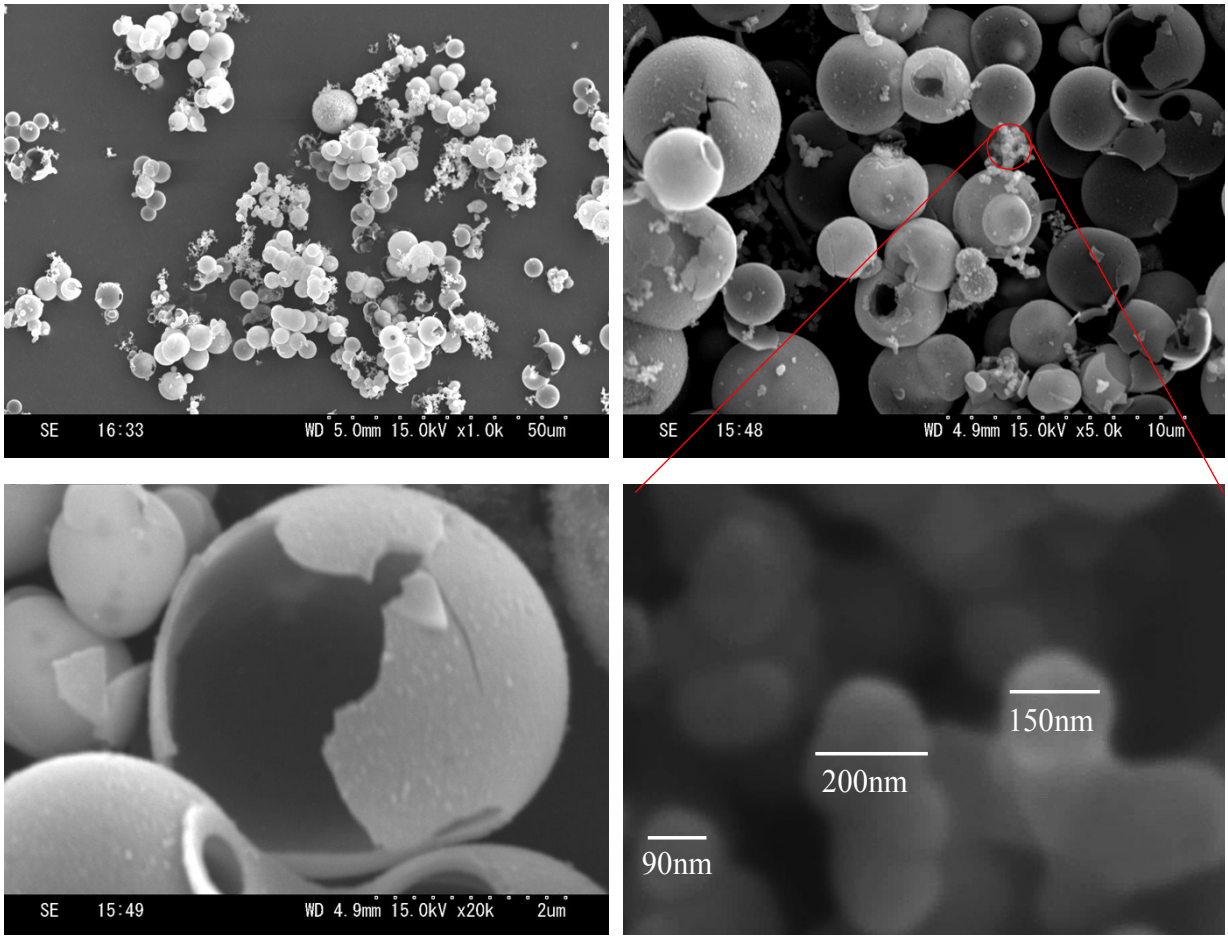

Fig. S1 SEM images of 'Y_2BaZnO_5:0.03Er' hollow shperes as prepared hydrothermally at 120 ℃ for 12 h and under different magnifications.

Fig. S2

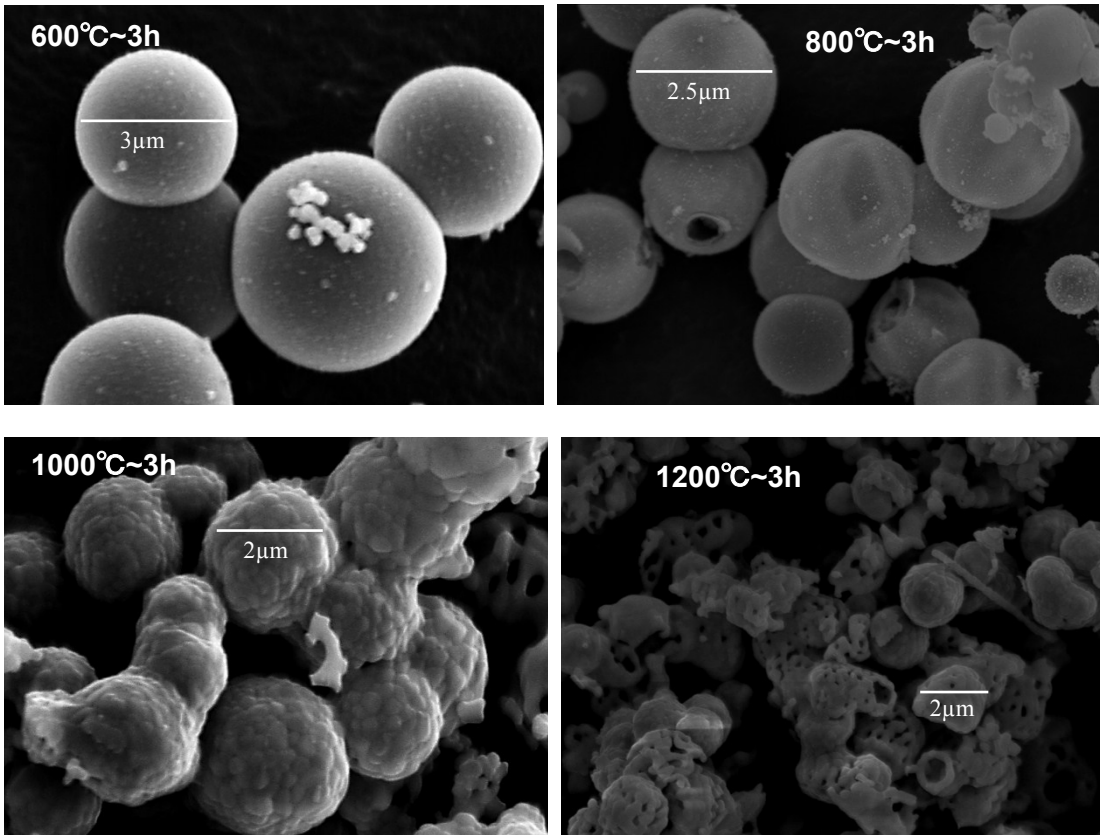

Fig. S2 SEM images of 'Y_2BaZnO_5:0.03Er' hollow shperes prepared hydrothermally at 120 ℃ for 12 h and heat treated at different temperatures.

Fig. S3

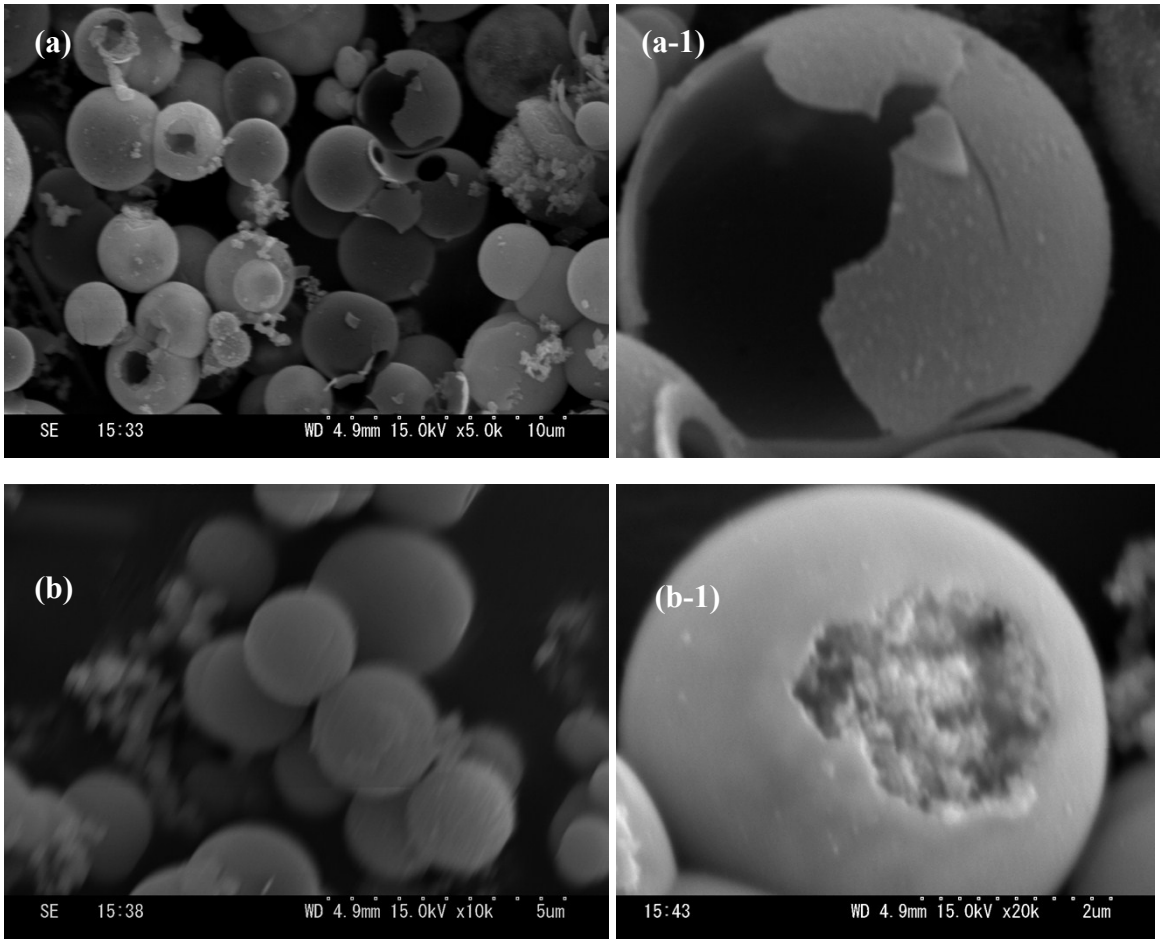

Fig. S3 SEM images of 'Y_2BaZnO_5:0.03Er' as prepared hydrothermally at 120 ℃ for 12 h: (a, a-1) under sufficient urea condition (metal ions to urea= 1 to 40) and (b, b-1) under low urea content (metal ions to urea= 1 to 4) to insure only precipitation to occur.

Fig. S4

Elemental composition of Y_2BaZnO_5:0.03Er (0.07Yb or 0.03V) samples measured by X-ray fluorescence spectroscopy (XRF)

Sample	*Elemental composition (weight %)*					
	Y_2O_3	*BaO*	*ZnO*	*Er_2O_3*	*Yb_2O_3*	*V_2O_5*
Y_2BaZnO_5:0.03Er only	48.26	33.12	17.51	1.11	0.0003	0
Y_2BaZnO_5:0.03Er, 0.07Yb	46.37	33.03	17.45	1.07	2.13	0
Y_2BaZnO_5:0.03Er, 0.03V	47.68	33.15	17.72	1.11	0.0002	0.35

Elemental composition of each sample in pressed pellet form was measured three times at different positions and data were averaged.

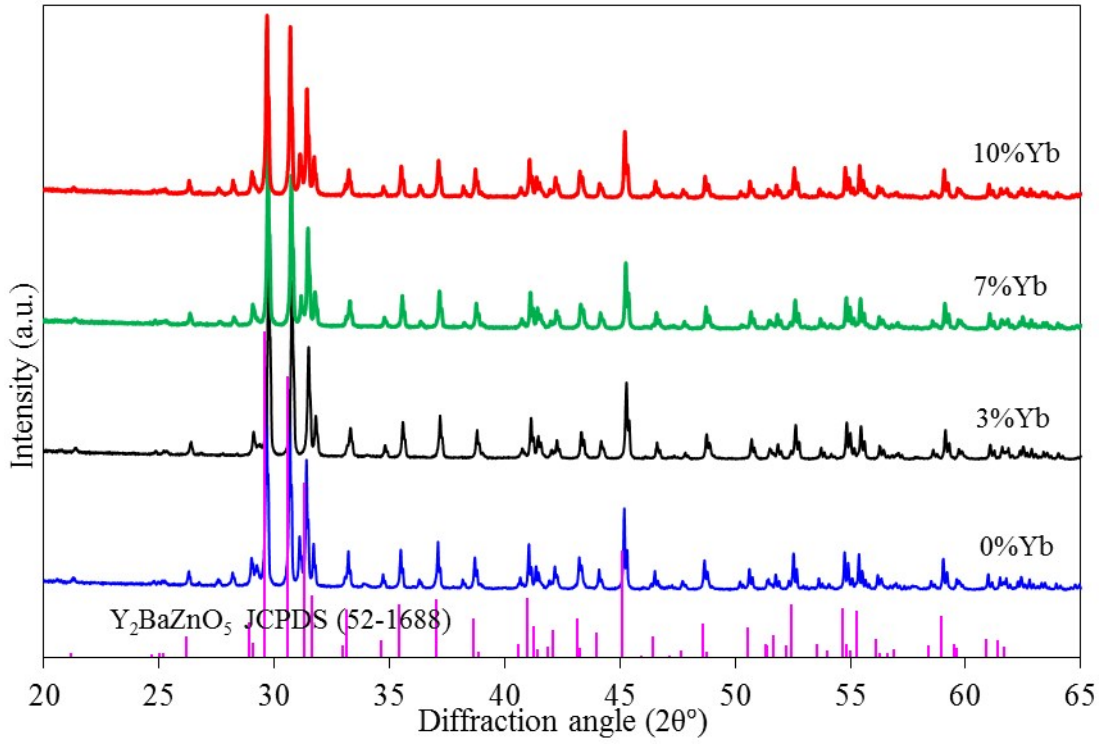

Fig.S5 XRD patterns of various moles of Yb^{3+} substituted Y_2BaZnO_5:0.03Er^{3+} phosphors