

## Electronic Supplementary Information (ESI) Improved photoluminescence behaviour of $\text{Eu}^{3+}$ activated $\text{CaMoO}_4$ Nanoparticles via $\text{Zn}^{2+}$ incorporation

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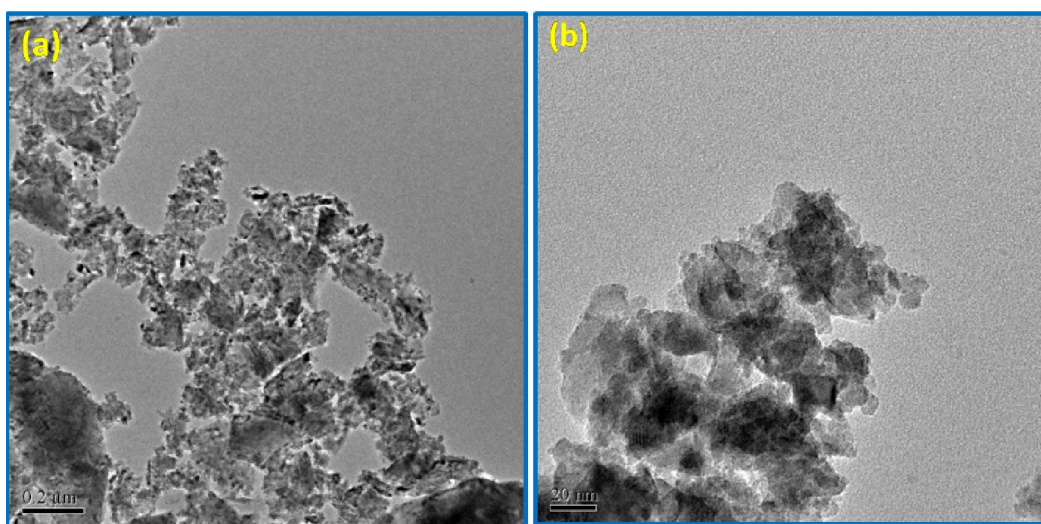


Fig.S1 TEM image of ASP  $\text{CaMoO}_4:\text{Eu}$  (a)  $\text{Zn}^{2+}$  free and (b) 2 at.%  $\text{Zn}^{2+}$  ion.

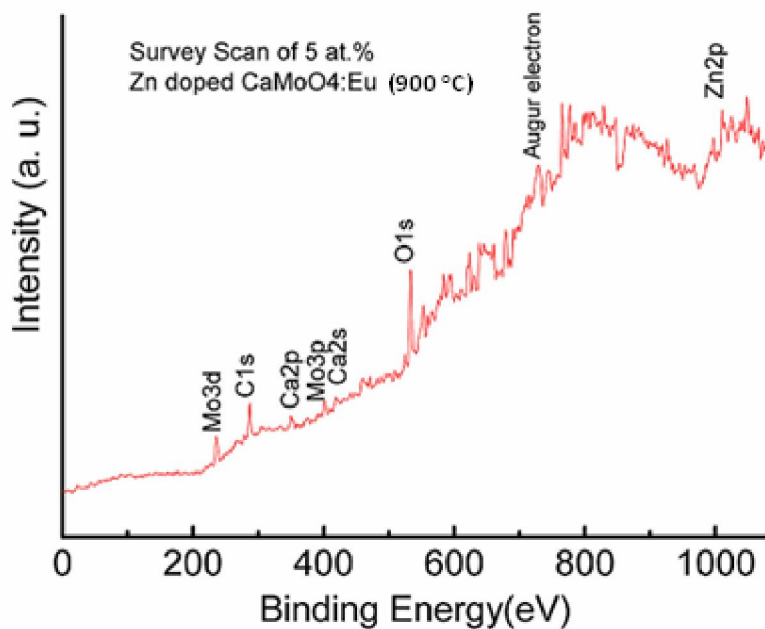


Fig.S2 XPS spectrum comprising of core BE levels of Ca, Mo, O, Eu/Zn

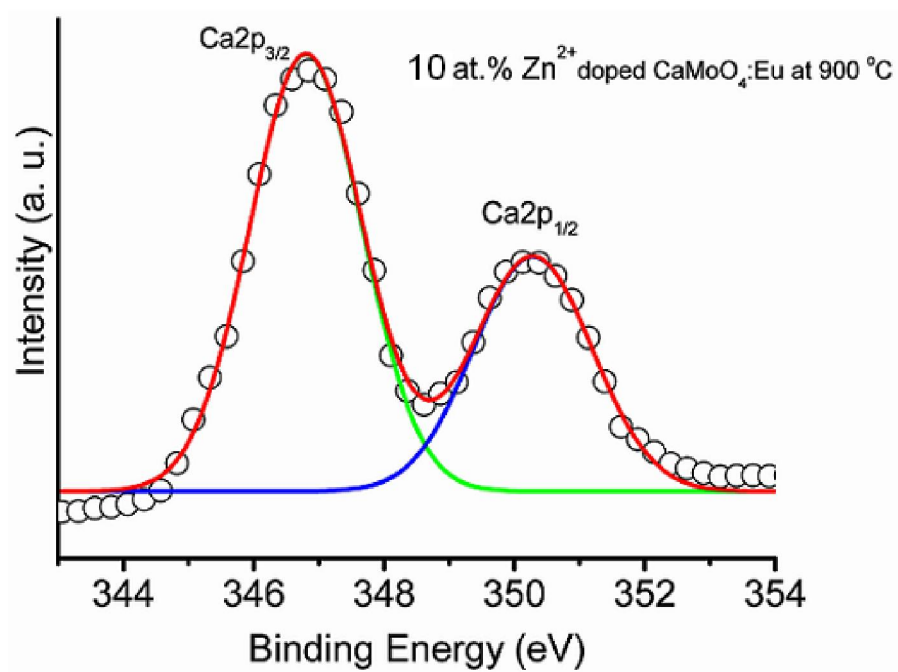


Fig.S3 De-convoluted Gaussian fitting of Ca2p peaks in XPS spectrum.

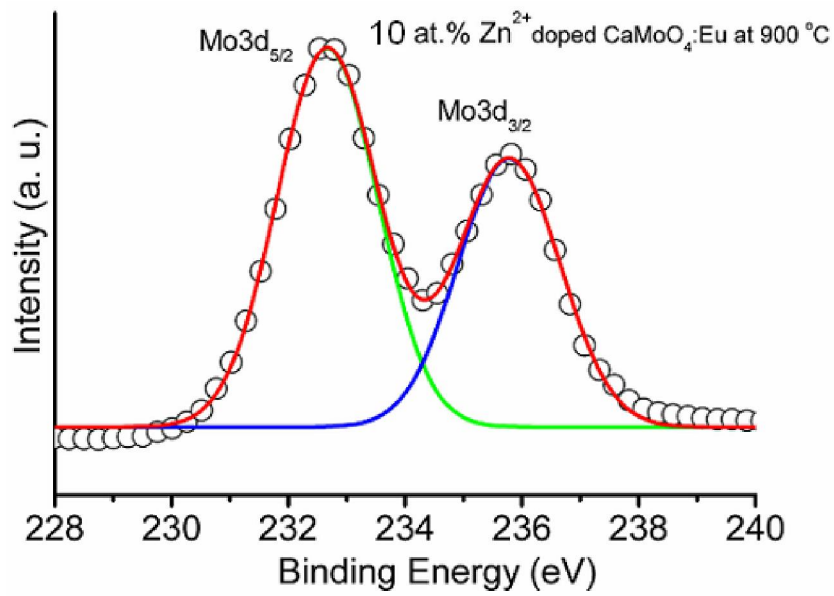


Fig.S4 De-convoluted Gaussian fitting of Mo3d peaks in XPS spectrum.

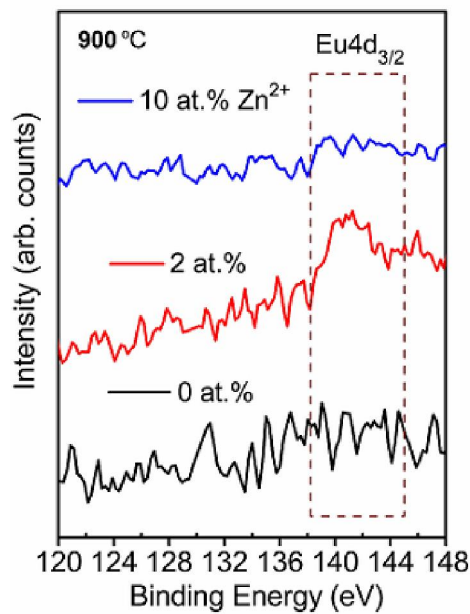


Fig.S5 XPS spectra of  $\text{Eu}^{3+}$  ion with  $\text{Zn}^{2+}$  (0, 2 and 10 at.%) concentration for 900 °C annealed samples in  $\text{CaMoO}_4:\text{Eu}$ .

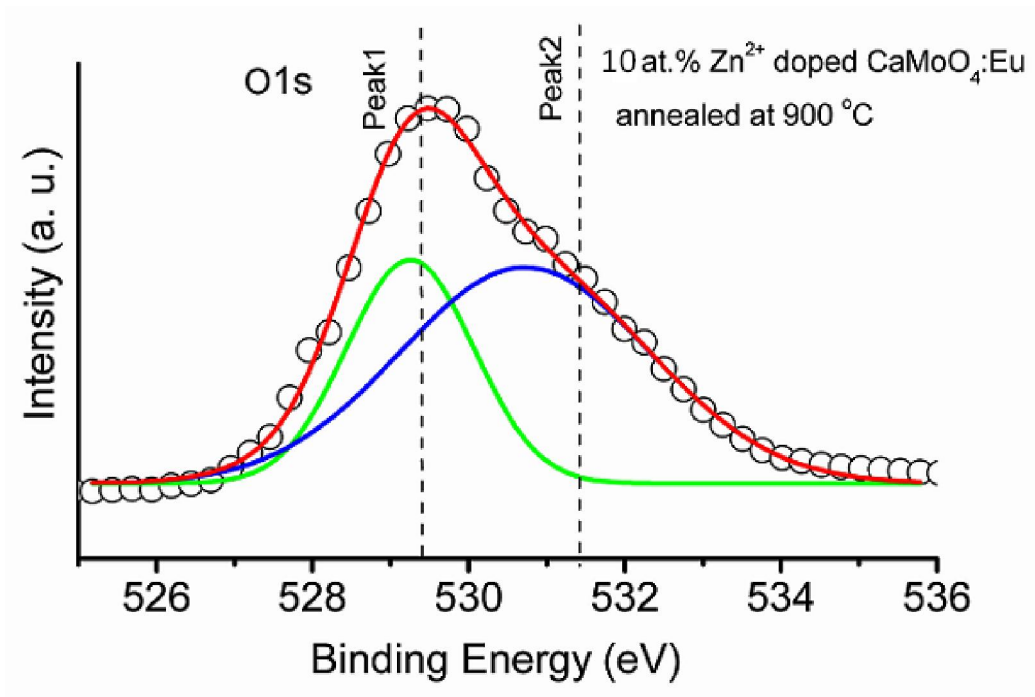


Fig.S6 De-convoluted peaks fitting of O1s XPS spectrum.

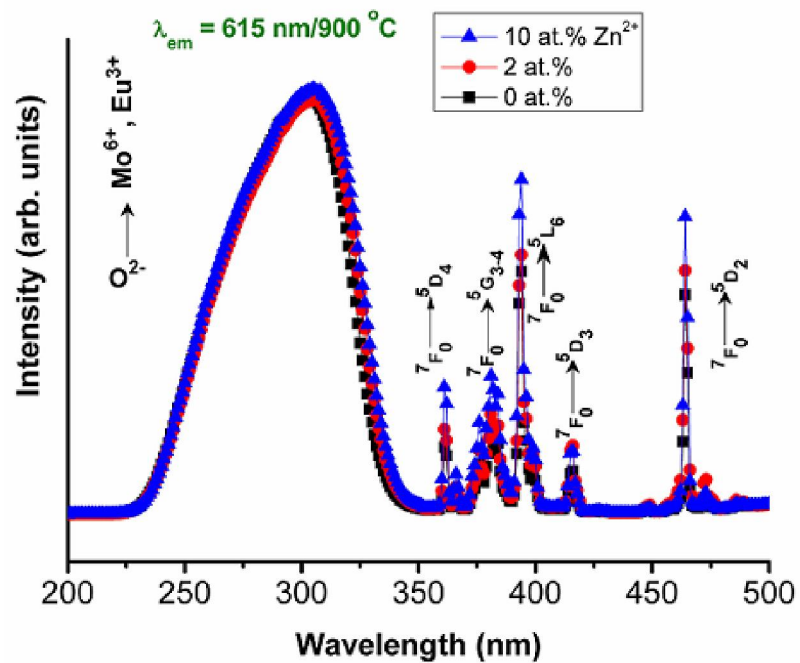


Fig.S7 Excitation spectra of Zn (0, 2, and 10 at.%) co-doped CaMoO<sub>4</sub>:Eu nanophosphors annealed at 900 °C samples at 615 nm emission wavelength.

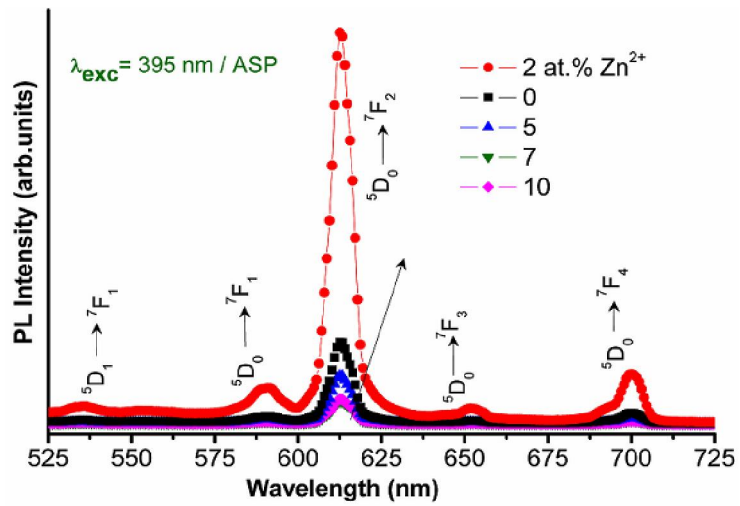


Fig.S8 Emission spectra of Zn<sup>2+</sup> (0, 2, 5, 7 and 10 at.%) co-doped CaMoO<sub>4</sub>:Eu for ASP samples at 395 nm excitation wavelength.

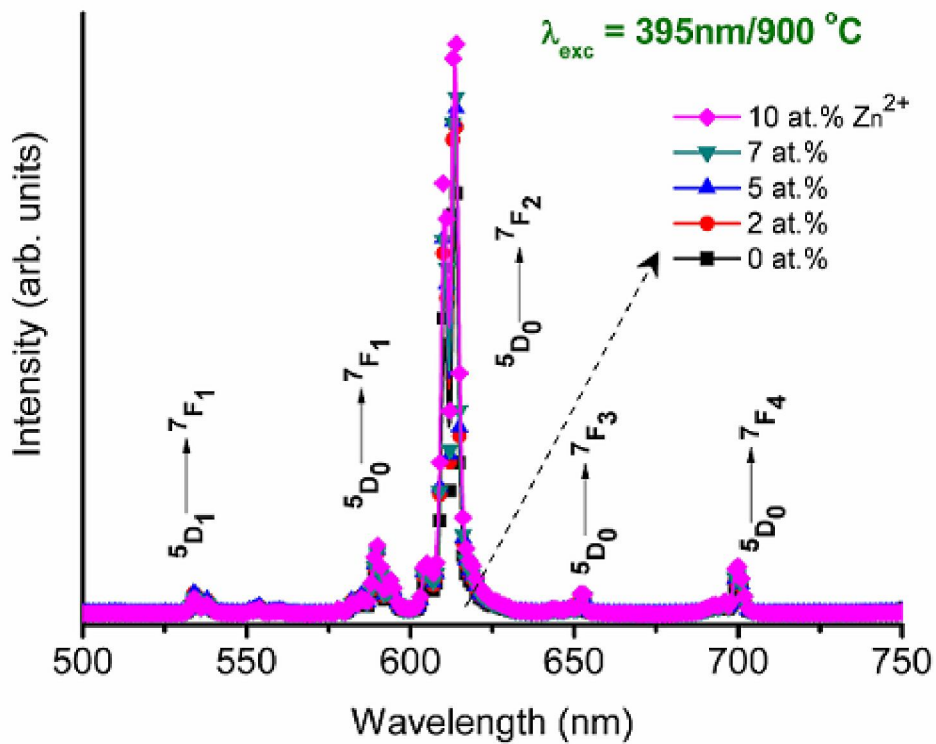


Fig. S9 Emission spectra of Zn<sup>2+</sup> (0, 2, 5, 7 and 10 at.%) doped CaMoO<sub>4</sub>:Eu under 395 nm excitation annealed at 900 °C samples.

**Table S1:** Lattice parameters of Zn<sup>2+</sup> co-doped CaMoO<sub>4</sub>:Eu for ASP and 900 °C annealed samples

Samples	Zn <sup>2+</sup> (at.%)	Cell Parameters		Cell volume (Å <sup>3</sup> )	Crystal size (nm)
		a = b(Å)	c(Å)		
<b>JCPDS 29-0351</b>					
	0	5.227	11.456	313.07	23.7
	2	5.230	11.462	313.56	27.2
<b>As-prepared</b>	5	5.224	11.487	313.51	32.1
	7	5.227	11.472	313.46	36.0
	10	5.226	11.471	313.45	37.4
<b>Annealed at 900 °C</b>	0	5.229	11.441	312.90	26.0
	2	5.229	11.442	312.95	30.4
	5	5.230	11.440	312.89	36.3
	7	5.224	11.448	312.53	40.3
	10	5.225	11.448	312.61	48.4

**Table S2** CIE values for Zn<sup>2+</sup> (Zn<sup>2+</sup> = 0, 2, 5, 7, 10 at.%) co-doped CaMoO<sub>4</sub>:Eu<sup>3+</sup> nanophosphors under 266 and 395 nm excitation wavelengths.

Excitation (nm)	Zn <sup>2+</sup> (at.%)	CIE Coordinates					
		As-prepared			Annealed (900 °C)		
		No	X	Y	No	X	Y
<b>266 nm</b>	0	a1	0.54	0.35	x1	0.58	0.36
	2	a2	0.53	0.36	x2	0.64	0.35
	5	a3	0.57	0.34	x3	0.65	0.34
	7	a4	0.56	0.33	x4	0.64	0.35
	10	a5	0.58	0.34	x5	0.64	0.35
<b>395 nm</b>	0	b1	0.56	0.35	y1	0.59	0.36
	2	b2	0.55	0.34	y2	0.61	0.36
	5	b3	0.54	0.33	y3	0.62	0.36
	7	b4	0.53	0.35	y4	0.62	0.36
	10	b5	0.56	0.32	y5	0.60	0.35