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

Influence of dimensionality on optical properties of doped assembly of gold nanoclusters

Supporting Information

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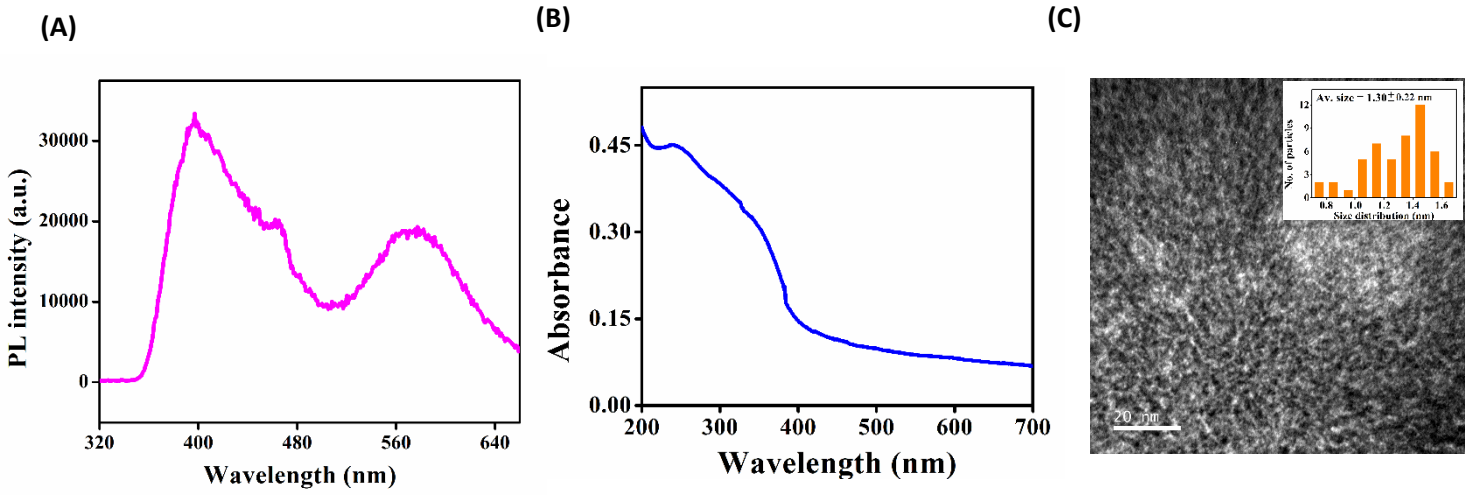
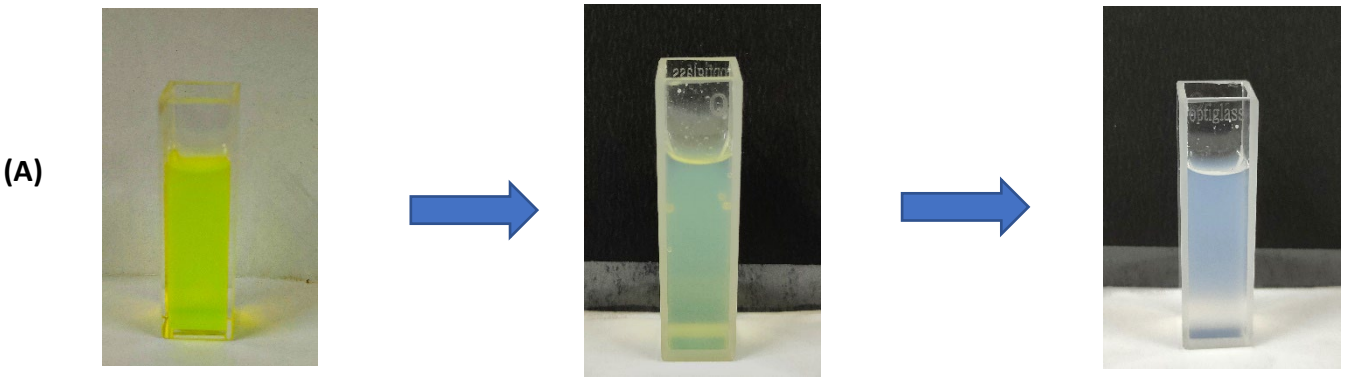


Fig. S1 (A) Emission spectrum of Au NCs upon excitation at 300nm. (B) UV-vis spectrum of Au NCs. (C) TEM image of Au NCs. Inset: particle size distribution in TEM image (C)

Under daylight:



Under UV light(365nm):

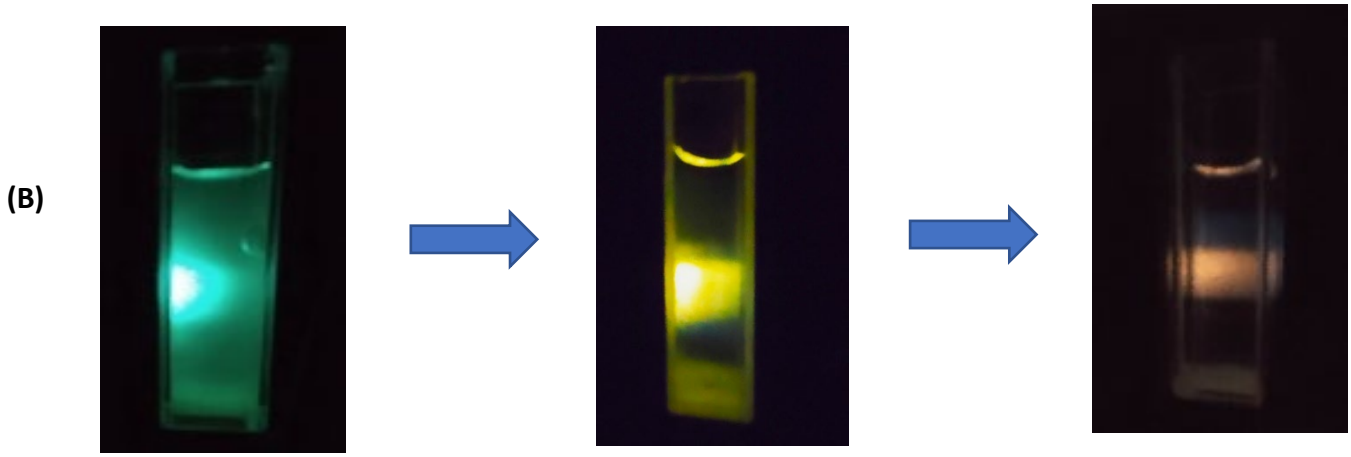


Fig. S2 Digital images of the reaction mixture at different stages. Reaction initiated after zinc acetate dihydrate & manganese acetate dihydrate were added to a solution of Au NCs - (A) under daylight and (B) under UV lamp.

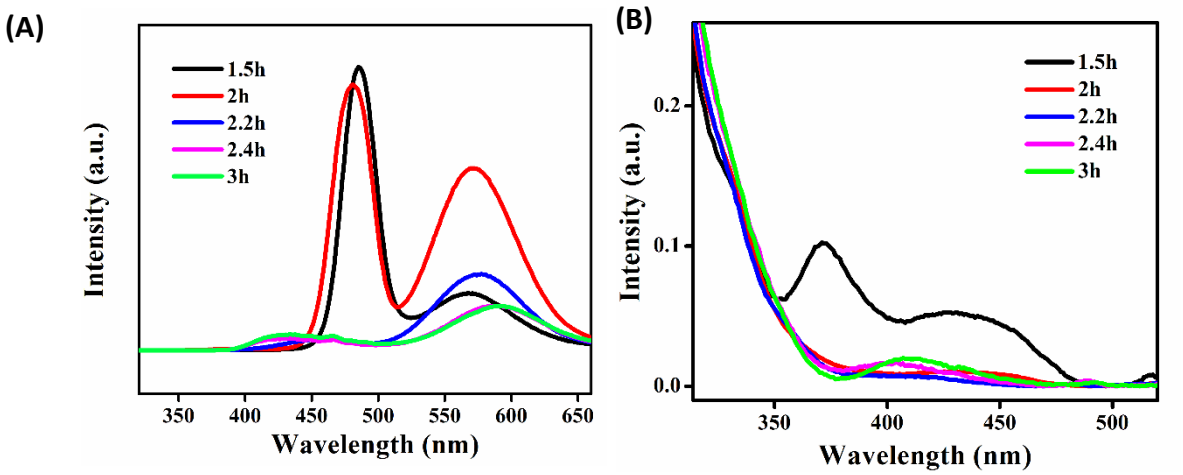


Fig. S3 (A) Emission ($\lambda_{excitation}$ = 300 nm) & (B) excitation spectra ($\lambda_{emission}$ = 565 to 595 nm) of Mn doped Zn Au NCs (Zn : Mn = 200 : 0.5(W/W in mg) at different reaction time.

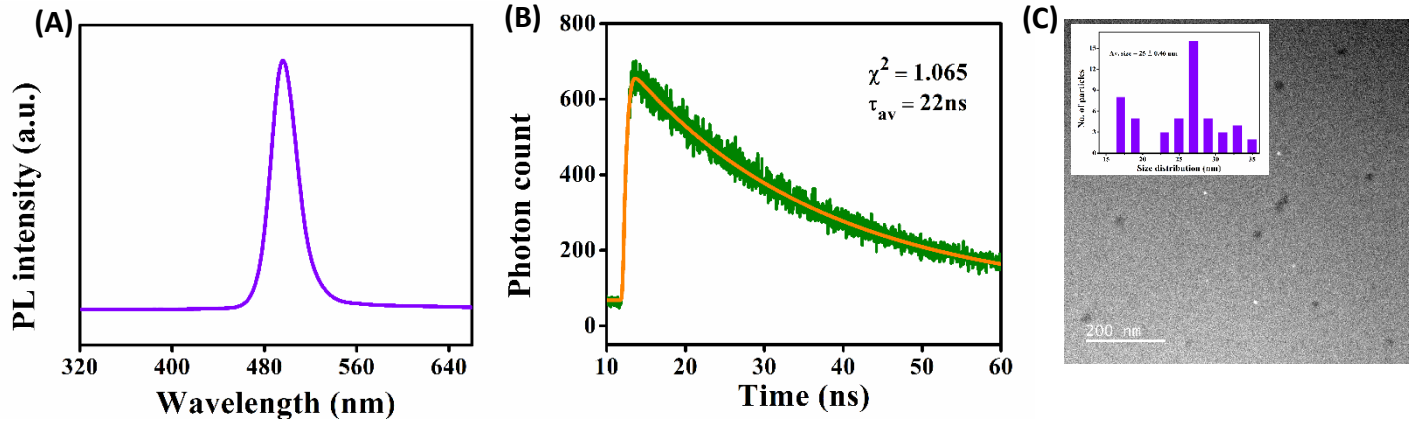


Fig. S4 (A) Emission spectrum of Zn Au NCs upon excitation at 300 nm. **(B)** Time resolved photoluminescence decay curve of Zn Au NCs. **(C)** TEM image of Zn Au NCs. Inset: particle size distribution in TEM image (C)

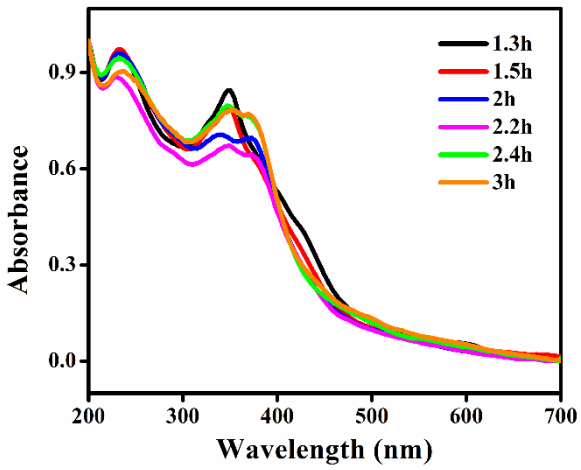


Fig. S5 UV-vis spectra of Mn^{2+} doped Zn Au NCs weight ratio of Zn:Mn = 200:0.5 at different reaction times.

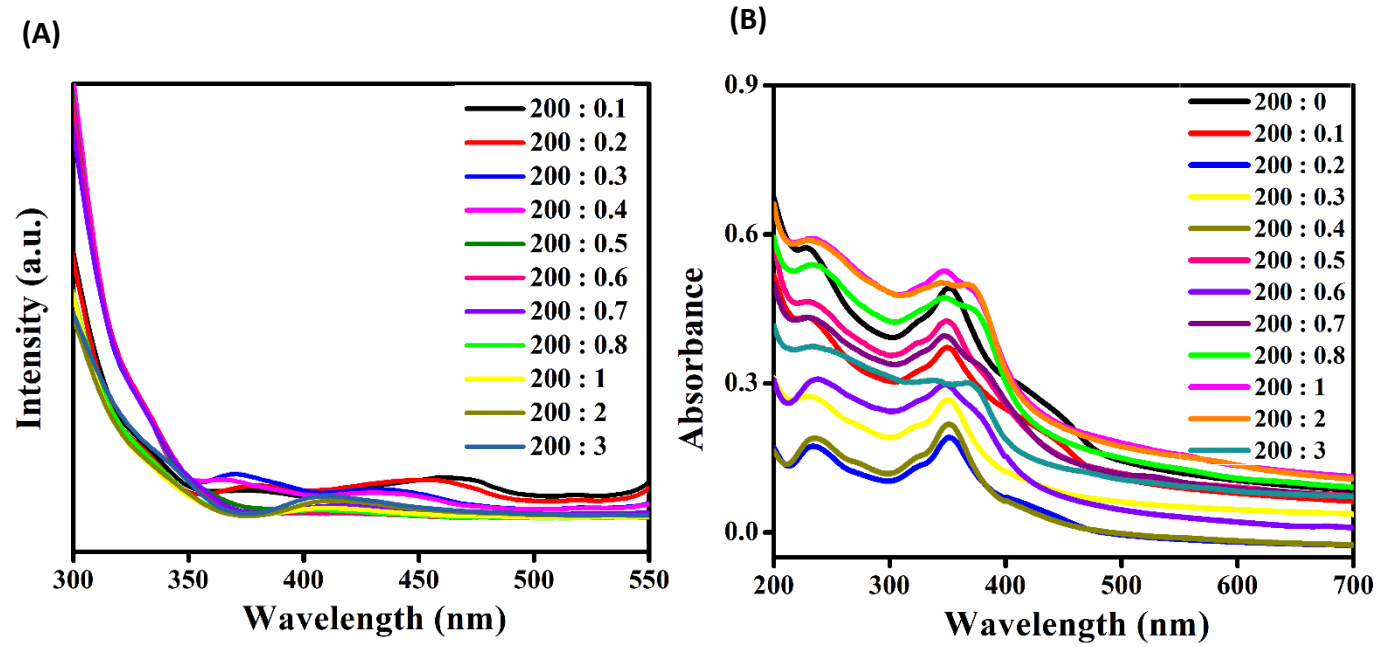


Fig. S6 (A) Excitation spectra($\lambda_{emission}$ = 565 to 595 nm) of Mn^{2+} doped Zn Au NCs after two hours of reaction with different Zn : Mn (W/W in mg) ratio. **(B)** UV-vis spectra of Mn^{2+} doped Zn Au NCs after two hours of reaction with different Zn : Mn (W/W in mg) ratio.

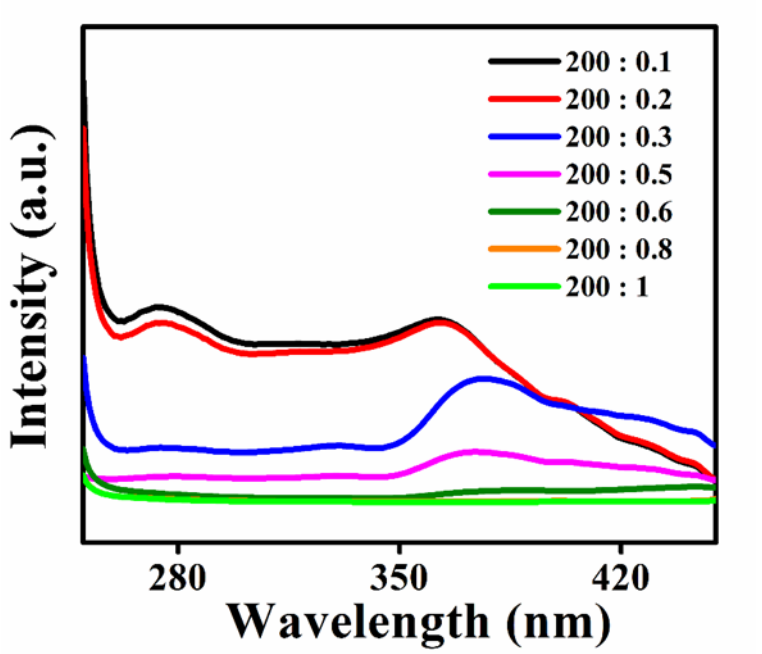


Fig. S7 Excitation spectra($\lambda_{emission}$ = 492 to 465nm) of Mn^{2+} doped Zn Au NCs at different Zn:Mn (W/W in mg) ratios after 2hrs.

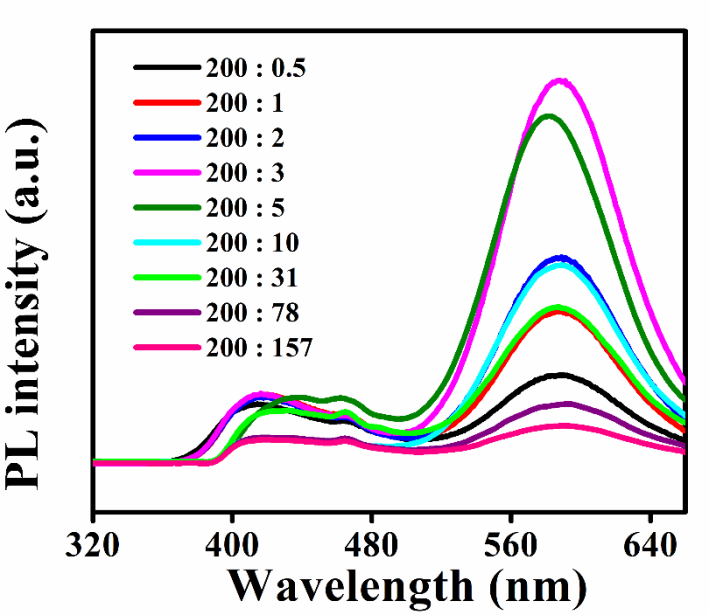


Fig. S8 Emission spectra of Mn^{2+} doped Zn Au NCs at completion of reaction with varying Zn : Mn (W/W in mg) ratio. Excitation at 300nm.

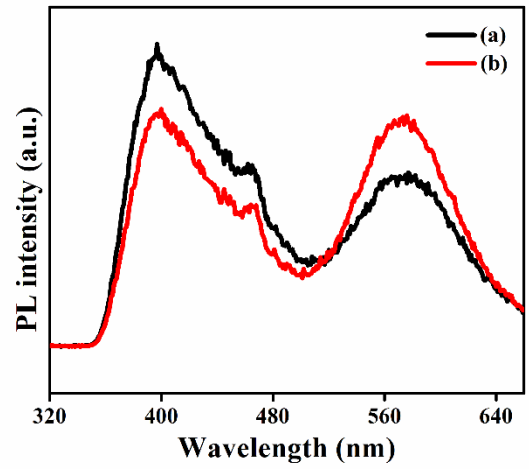


Fig. S9 Emission spectra of (a) Au NCs & (b) after addition of Mn- acetate, exciting at 300nm.

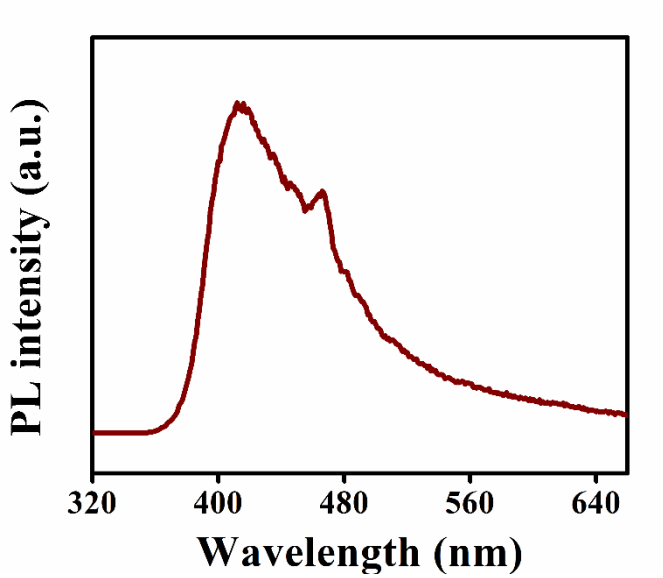


Fig. S10 Emission spectra of Zn Au NCs after addition of Mn- acetate exciting at 300nm.

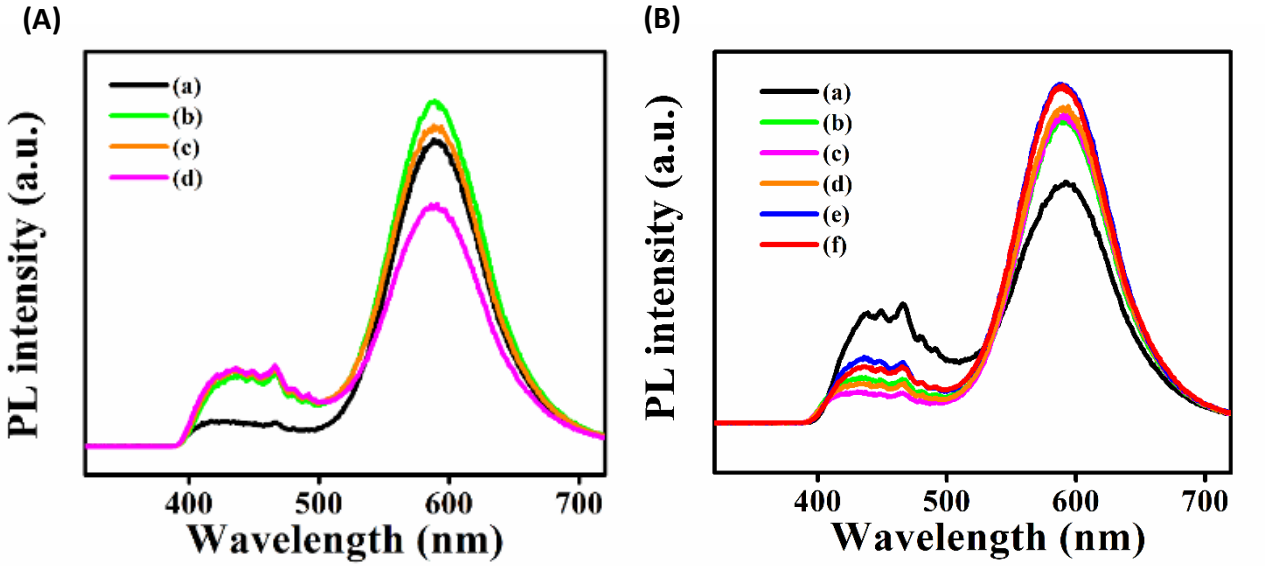


Fig. S11 Emission spectra of (A) Mn doped Zn Au NCs (exciting at 300 nm) after addition of 13 mM Zn acetate at (a) 0 min, (b) 20min, (c) 4h, (d) 20h. (B) Mn doped Zn Au NCs (exciting at 300 nm) after addition of (a) 0 mM, (b) 1.23 mM (c) 2.38 mM (d) 3.44 mM (e) 5.55 mM (f) 7.44 mM zinc acetate.

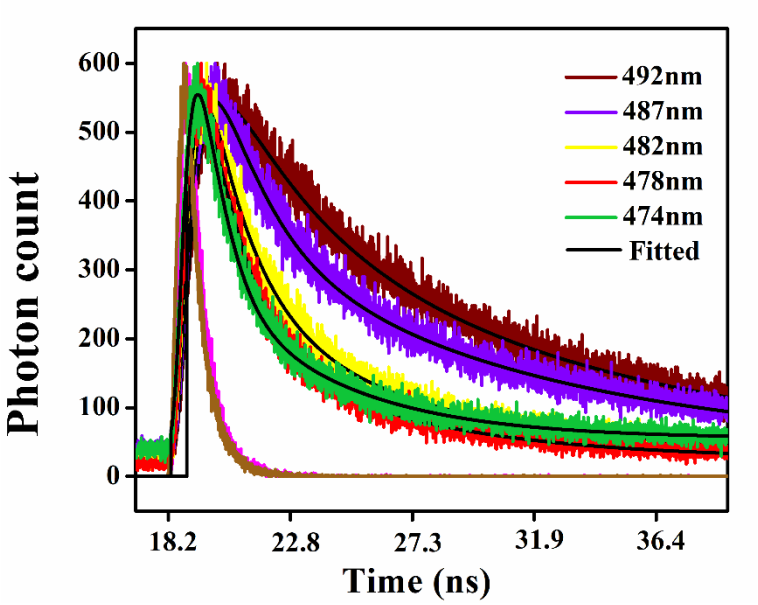


Fig. S12 Time resolve photoluminescence spectrum of Mn doped Zn Au NCs with Zn : Mn(W/W in mg)= 200 : 0.5 emitting at different wavelength with time respectively.

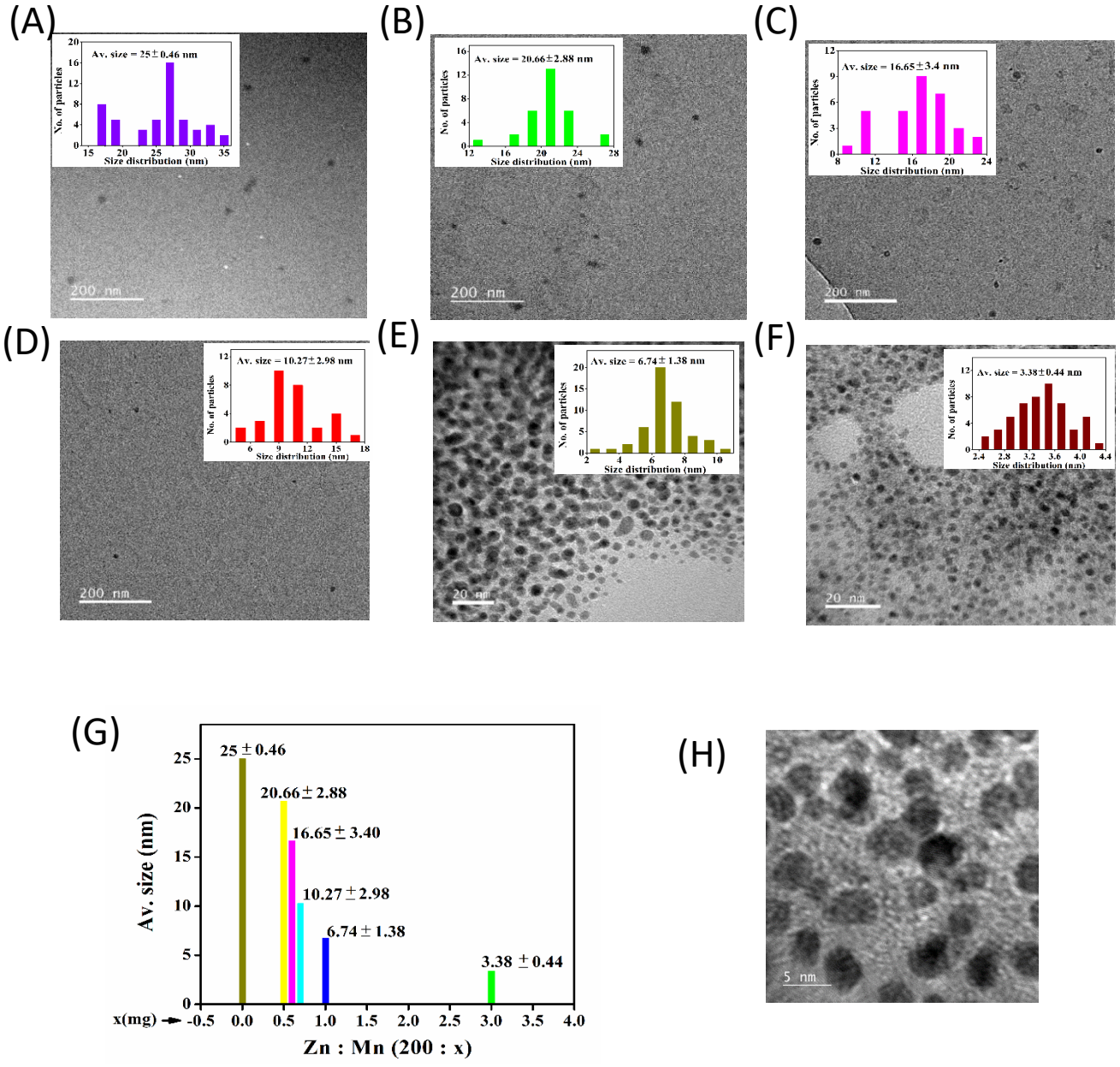


Fig. S13 TEM image with size distribution (inset) of Mn^{2+} doped Zn Au NCs after two hours of reaction with Zn:Mn (w/w in mg) ratio (A) 200:0, (B) 200:0.5, (C) 200:0.6, (D) 200:0.7 , (E) 200 : 1, (F) 200:3. (G) Corresponding plot of average size of Mn^{2+} doped Zn Au NCs assembly as function of Zn:Mn ratio is reaction mixture. (H) HRTEM image of Mn^{2+} doped Zn Au NCs after two hours of reaction with Zn:Mn (w/w in mg) ratio 200:2.

Table S1 Elemental analysis from XPS at 2hrs & 4hrs of reaction with different Zn : Mn (W/W) ratio.

Compound (Zn : Mn)	% of Mn	% of Zn	% of Au	Atomic ratio Mn : Zn : Au	Reaction time (hrs)
200 : 0.5	1.42	59.24	39.33	1 : 42 : 28	2
200 : 0.5	6.51	43.44	50.03	1 : 7 : 8	4
200 : 1	6.78	40.82	52.39	1: 6 : 8	4
200 : 3	11.64	55.76	32.60	1 : 5 : 3	4

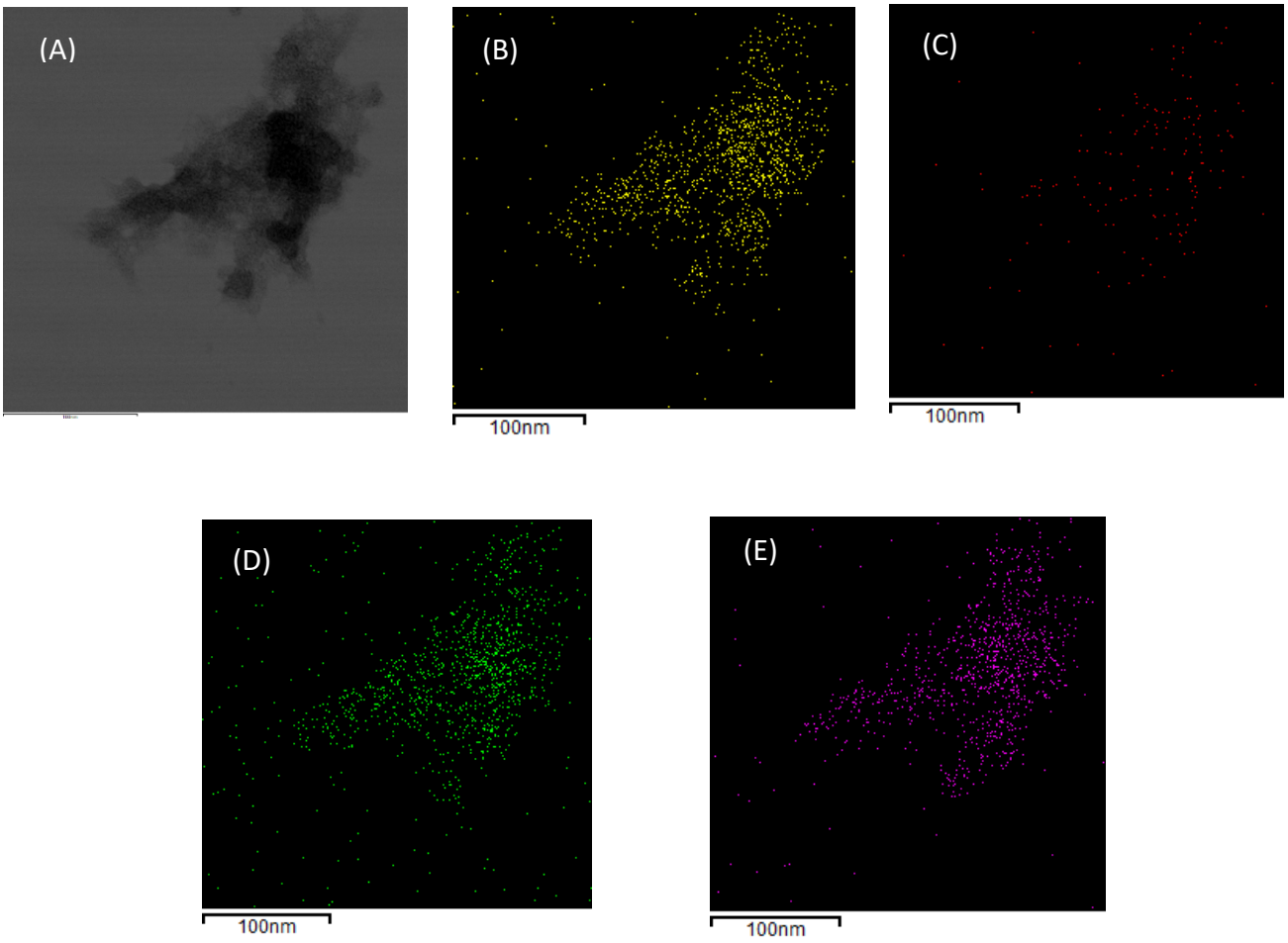


Fig. S14 (A) TEM image of Mn doped Zn Au NCs. Elemental mapping of (B) Au, (C) Mn and (D) Zn, (E) S in Mn doped Zn Au NCs. The scale bars in all the images are 100 nm.

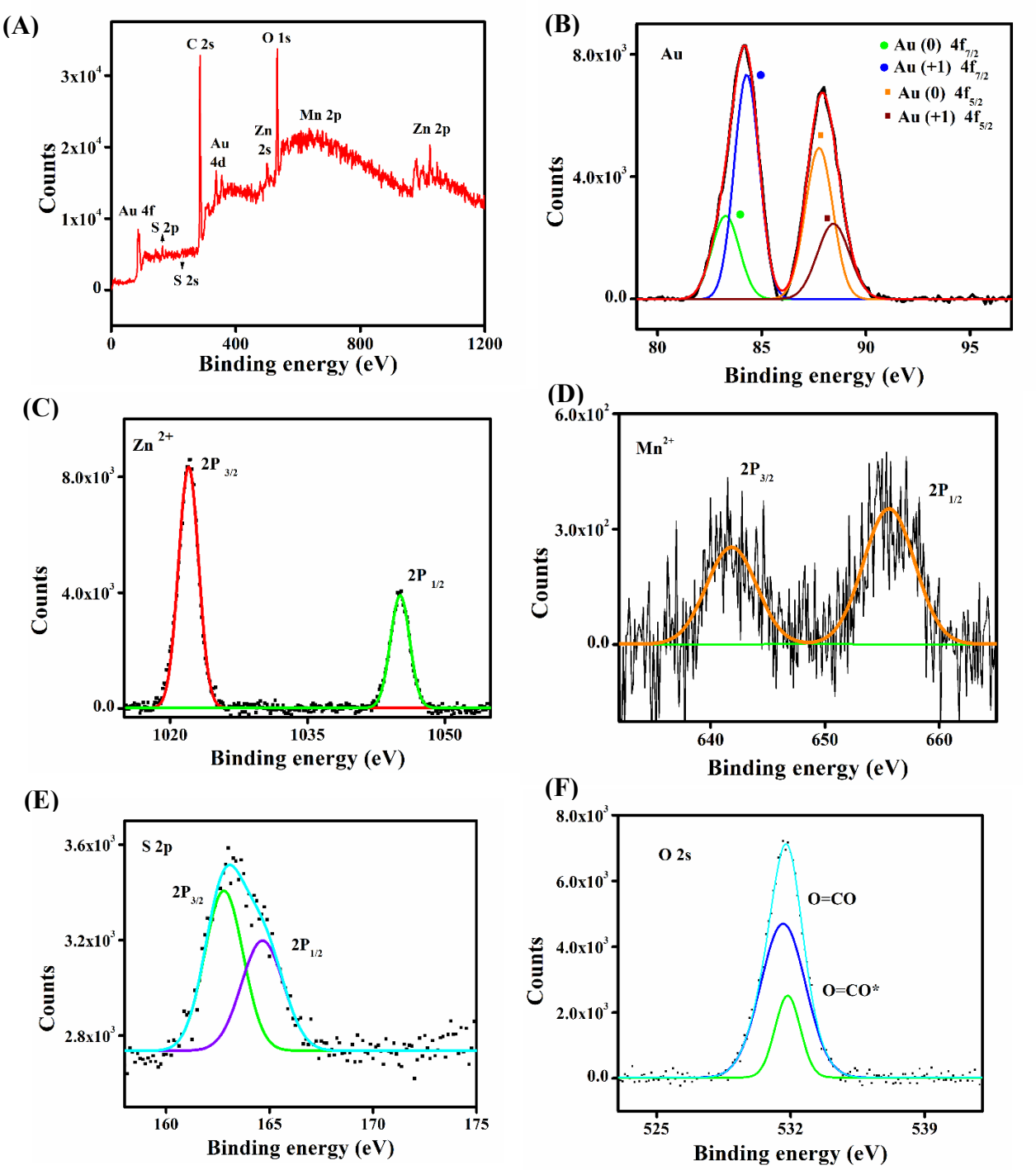


Fig. S15 (A): Survey XPS spectrum of Mn^{2+} doped Zn Au NCs. (B) XPS spectrum of Au element in Mn^{2+} doped Zn Au NCs. (C) XPS spectrum of Zn element in Mn^{2+} doped Zn Au NCs. (D) XPS spectrum of Mn element in Mn^{2+} doped Zn Au NCs. (E) XPS spectrum of S element in Mn^{2+} doped Zn Au NCs. (F) XPS spectrum of O element in Mn^{2+} doped Zn Au NCs.

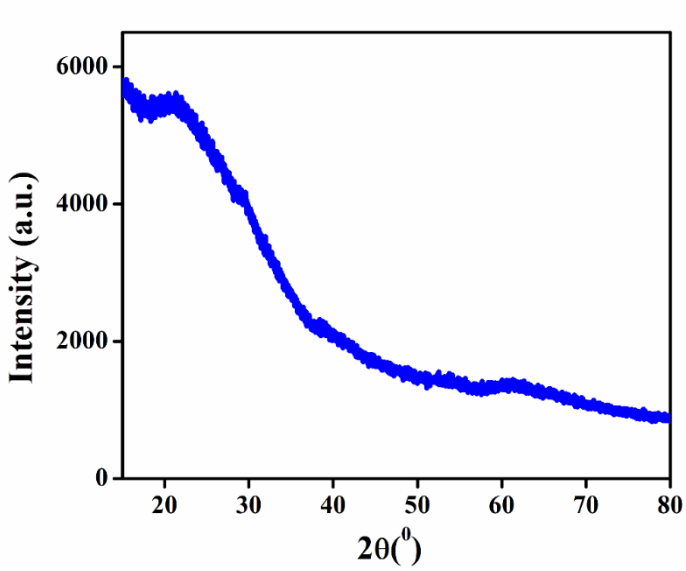


Fig. S16 XRD spectra of Mn^{2+} doped Zn Au NCs.

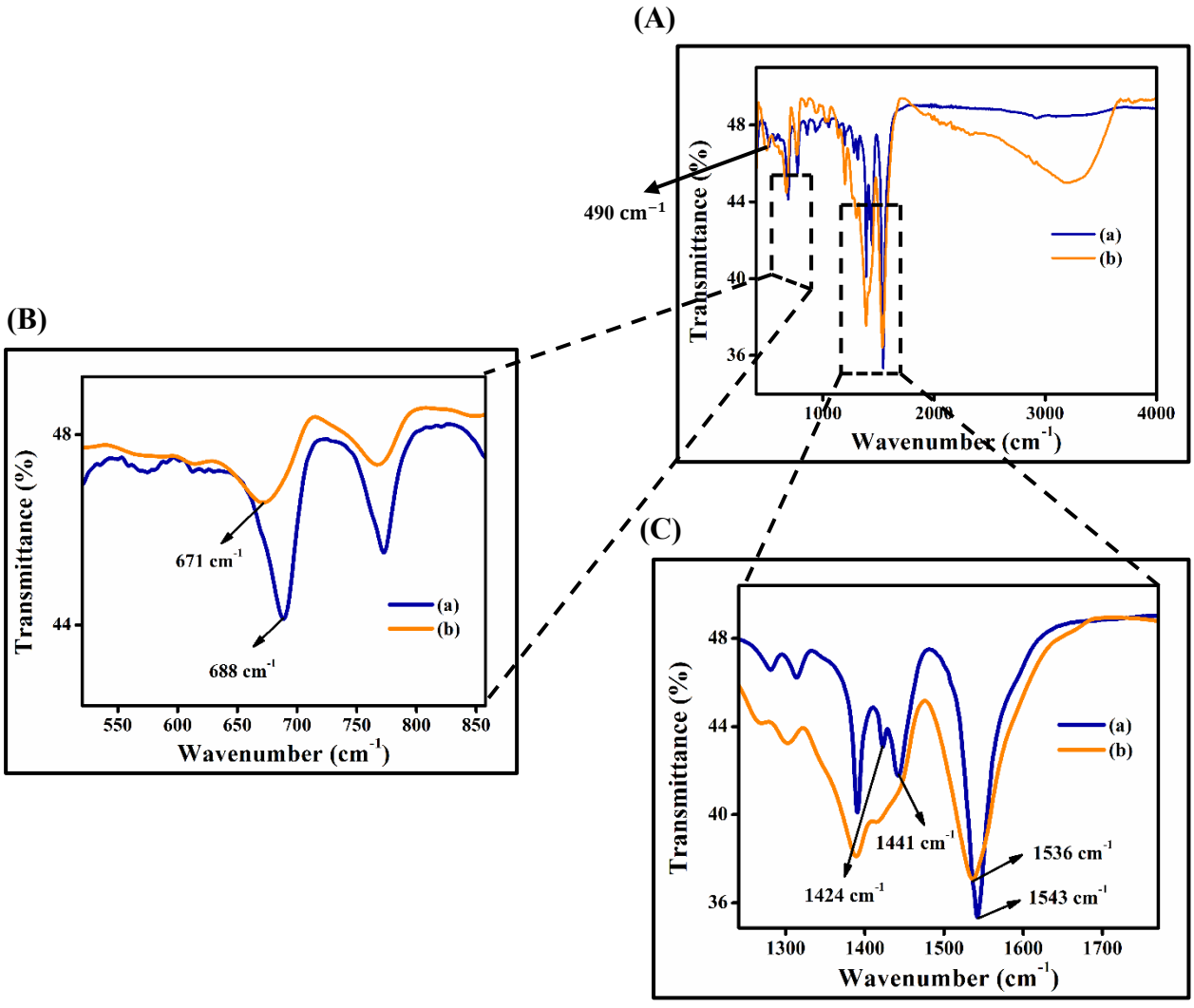


Fig. S17 (A) FTIR spectra of **(a)** Zn Au NCs and **(b)** Mn^{2+} doped Zn Au NCs. **(B)** Zoomed FTIR spectra corresponding to **(A)** showing peaks between 600 to 800 cm^{-1} **(C)** Zoomed FTIR spectra corresponding to **(A)** showing peaks between 1200 to 1560 cm^{-1}.

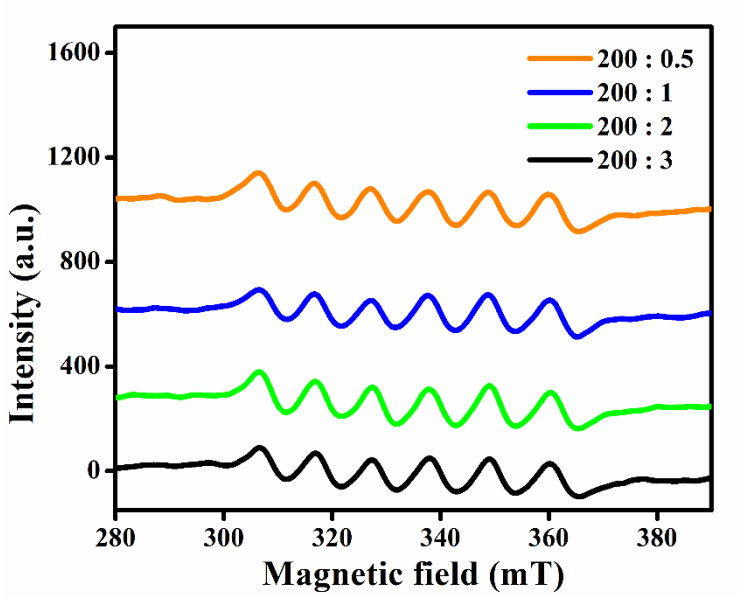


Fig. S18 EPR spectrum of Mn^{2+} doped Zn Au NCs with different Zn : Mn (W/W in mg) at 4hrs.