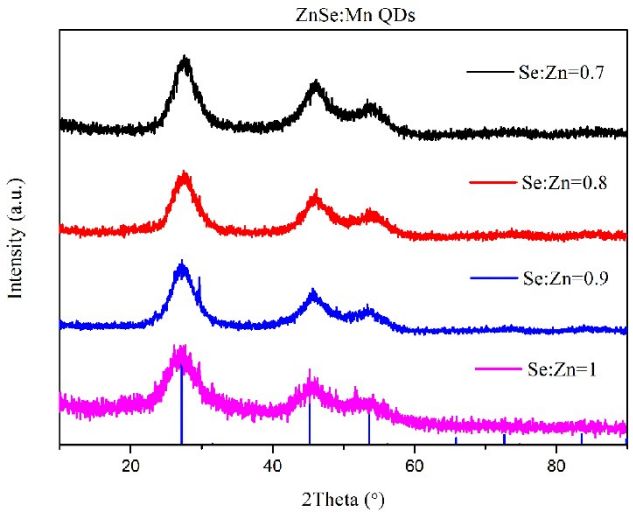

Figure S1. XRD patterns of ZnSe:Mn QDs with different Se:Zn ratio

Table S1. Element determination of ZnSe:Mn QDs with different ratios of Se:Zn precursor

Se:Zn:Mn ratio in precursor	Se (mmol/L)	Zn (mmol/L)	Mn (mmol/L)	Se:Zn:Mn ratio in product
0.7:1:0.04	0.31	0.46	0.02	0.67:1:0.04
0.8:1:0.04	0.38	0.52	0.01	0.73:1:0.02
0.9:1:0.04	0.79	0.89	0.04	0.89:1:0.04
1:1:0.04	1.37	1.49	0.07	0.92:1:0.04

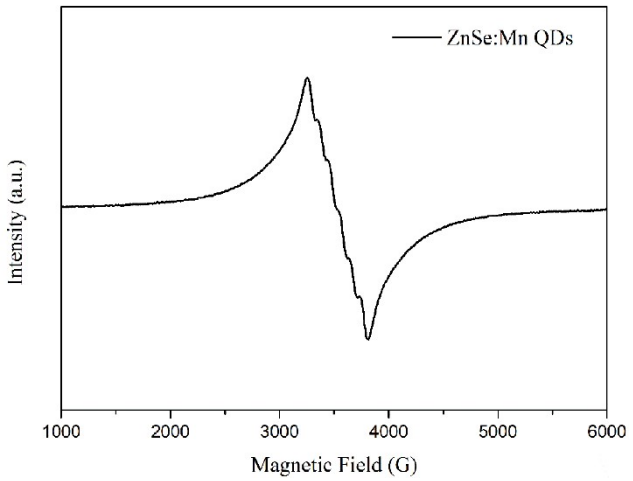

Figure S2. EPR spectra of the as-prepared Se-rich ZnSe:Mn QDs

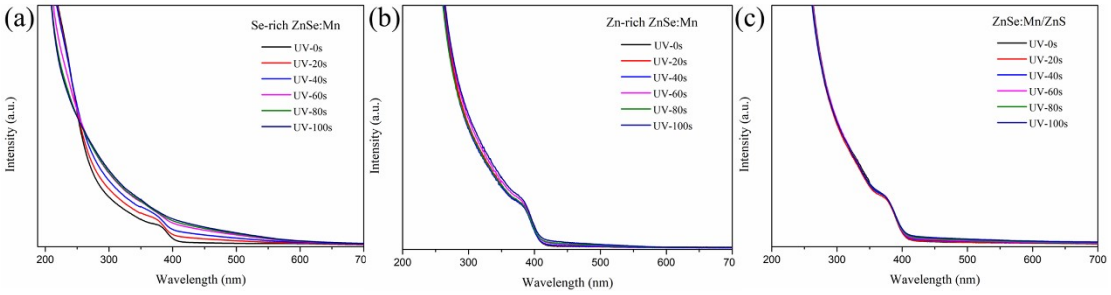

Figure S3. UV-Vis absorption spectra of a) Se-rich ZnSe:Mn QDs, b) Zn-rich ZnSe:Mn QDs and c) ZnSe:Mn/ZnS QDs under continue photo-irradiation from 0 s to100 s in 20 s intervals.

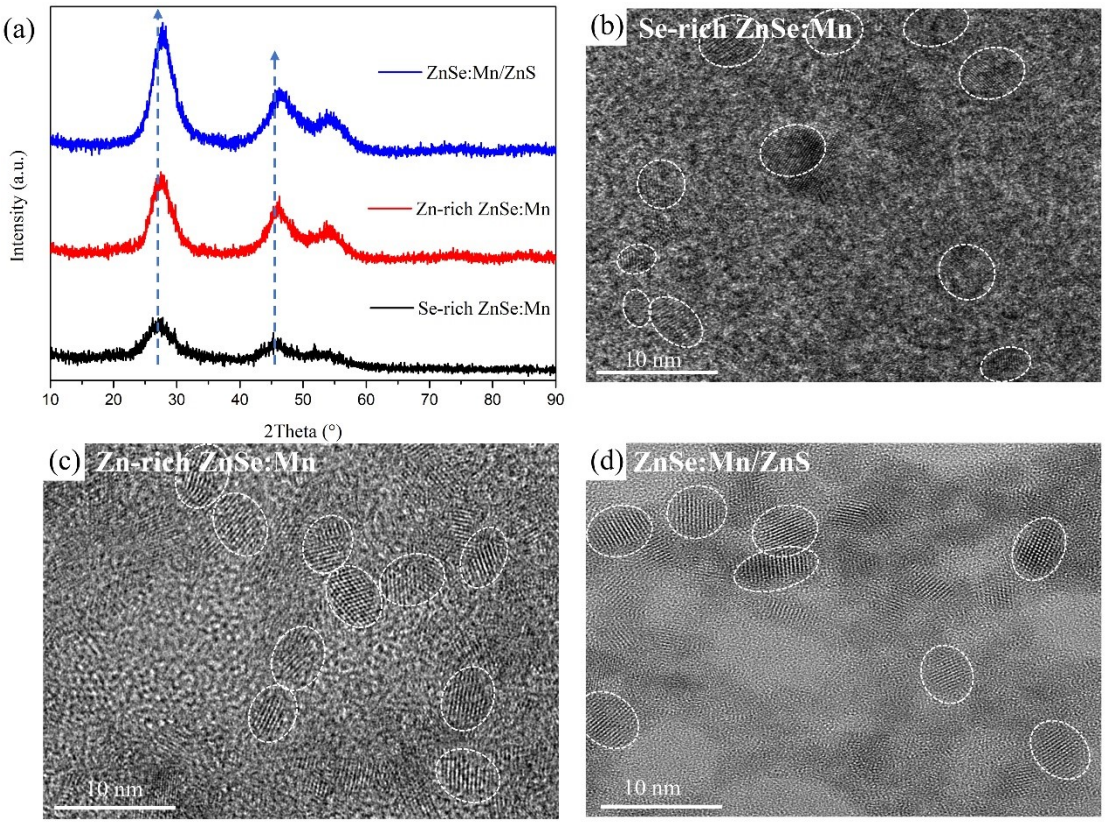

Figure S4. a) XRD patterns of Se rich, Zn rich ZnSe:Mn QDs and ZnSe:Mn/ZnS QDs; HRTEM images of b) Se-rich ZnSe:Mn, c) Zn-rich ZnSe:Mn and d) ZnSe:Mn/ZnS QDs.

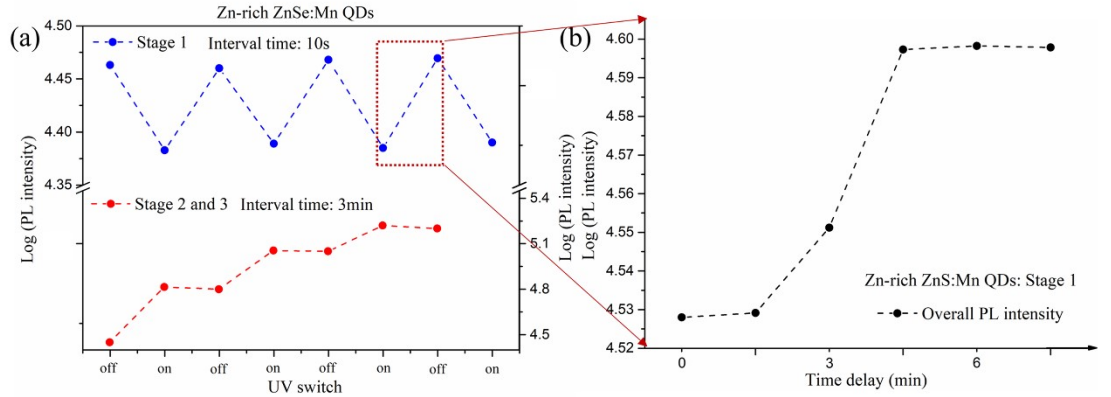

Figure S5. a) logarithm values of PL intensity of Zn-rich ZnSe:Mn QDs though switching photoirradiation; blue line: the temporary photo-response , red line: permanent photo-response. b) the recovery of PL intensity after photo-irradiation with time delay.

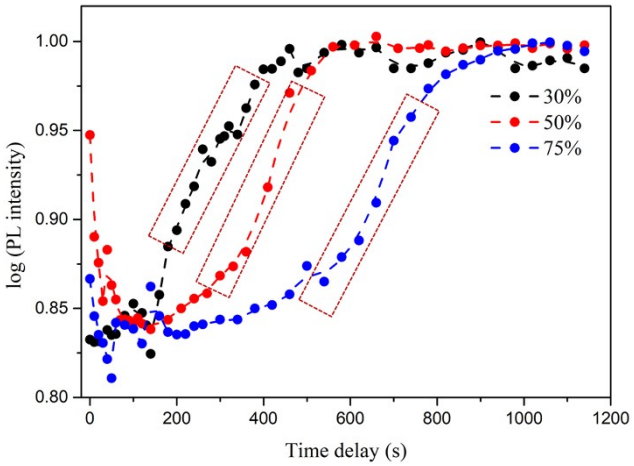

Figure S6. The change trend of PL intensity of Zn-rich ZnSe:Mn QDs with different zinc nitrate precursor doses under continuous photo-irradiation.

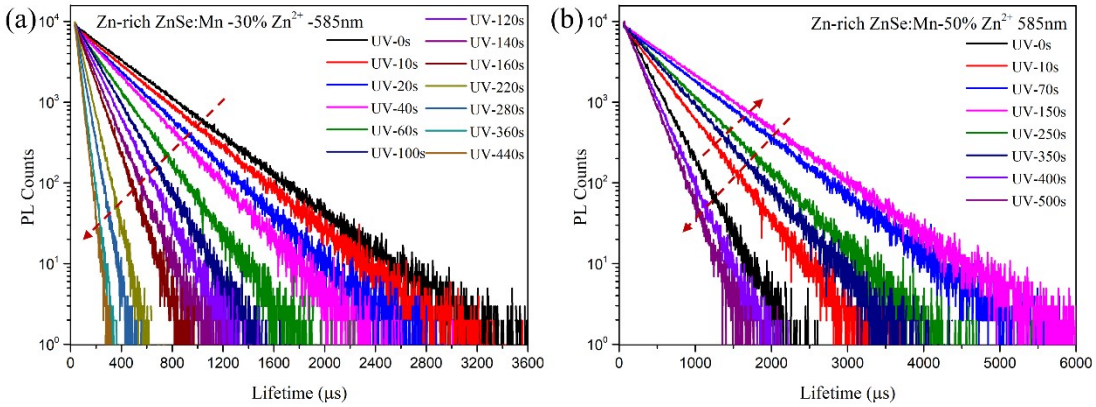

Figure S7. Time-resolved PL decay curves of ZnSe:Mn QDs with 30% and 50% Zn adducts upon exposure to UV irradiation under ambient conditions.

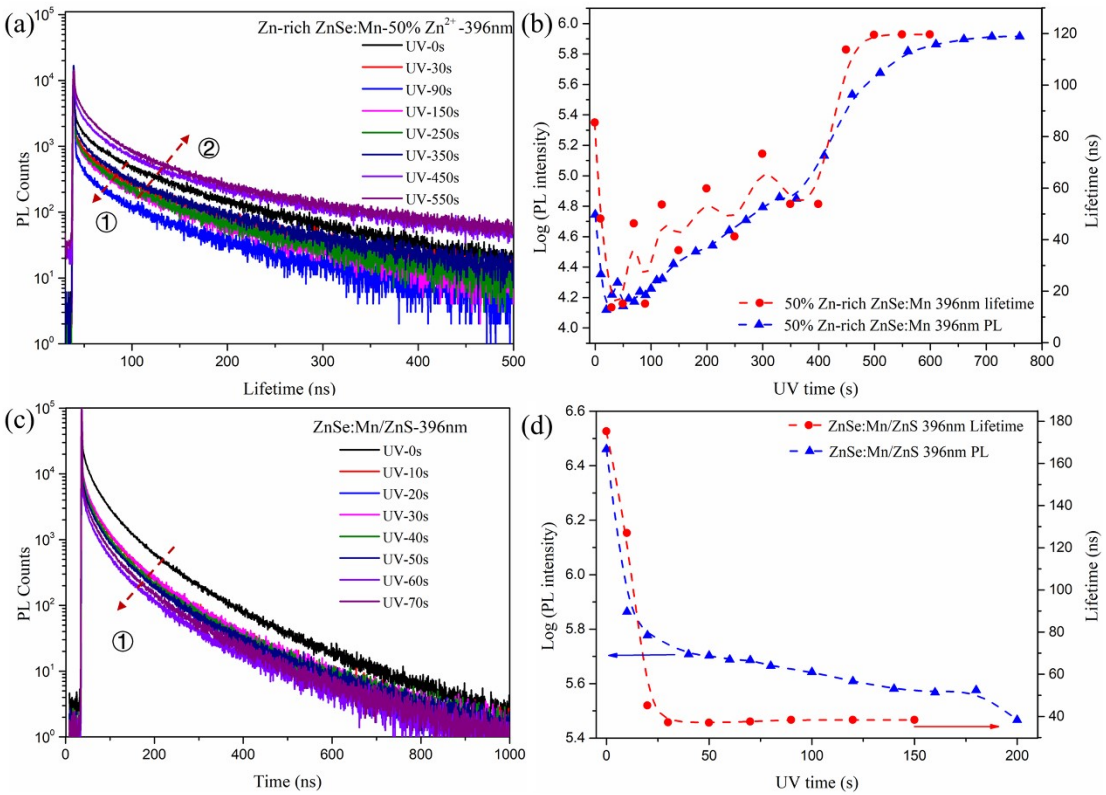

Figure S8. Time-resolved PL decay curves of a) Zn-rich ZnSe:Mn QDs and c) ZnSe:Mn/ZnS QDs upon UV irradiation under ambient conditions; b,d) The corresponding lifetime (red) and logarithm values of PL intensity (blue) against irradiation time;

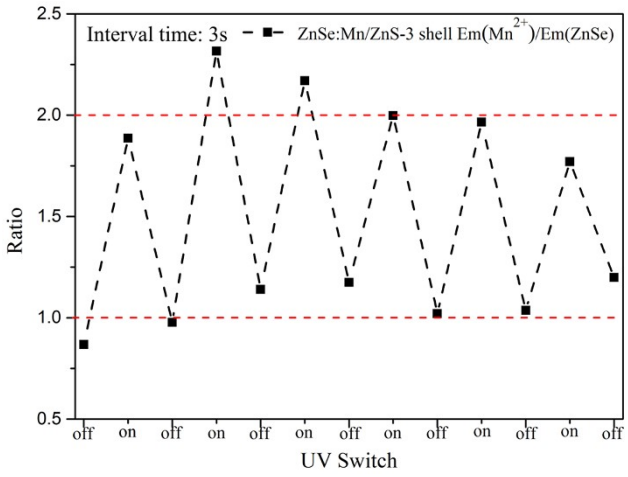

Figure S9. PL intensity ratio of dopant/band-edge emission variations with switched photo-irradiation;

photo-response
video.mp4

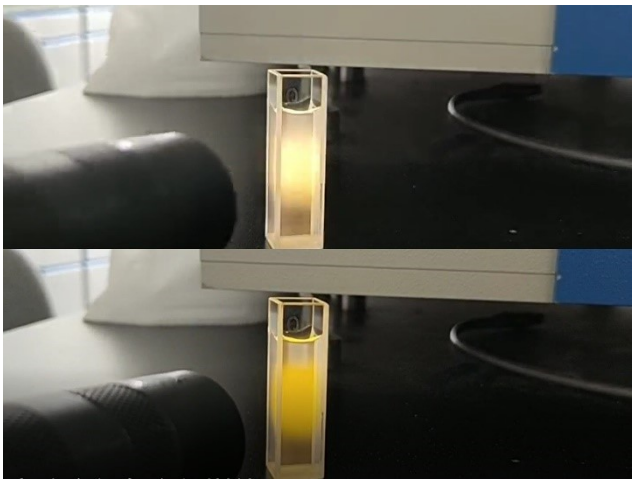

Figure S10. a) Video of photo response of ZnSe:Mn/ZnS inks; b) screenshot photos with playback time in the range of 1 s and 2 s.