Electronic supplementary information

Preparation of Zn2GeO4:Mn,In persistent luminescence nanoparticle composites for detection of copper ions

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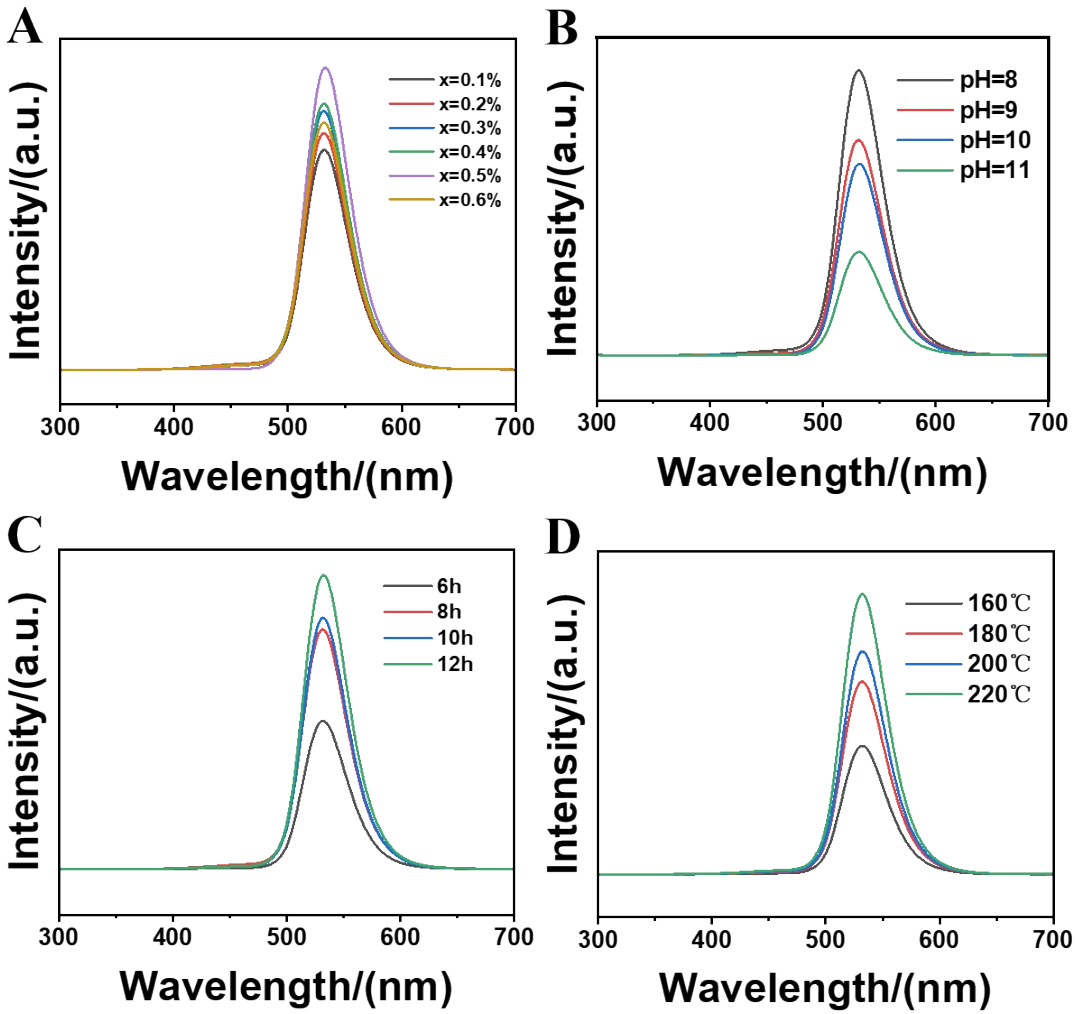

Fig. S1 (A)Emission spectra of Zn_2GeO_4:xMn^{2+}.(B) Emission spectra of Zn_2GeO_4: 0.5% Mn^{2+}、yIn^{3+} at different pH values.(C)Emission spectra of Zn_2GeO_4: 0.5% Mn^{2+}、0.3% In^{3+} at different reaction times.(D) Emission spectra of Zn_2GeO_4: 0.5% Mn^{2+}、 0.3% In^{3+} at different reaction temperatures.

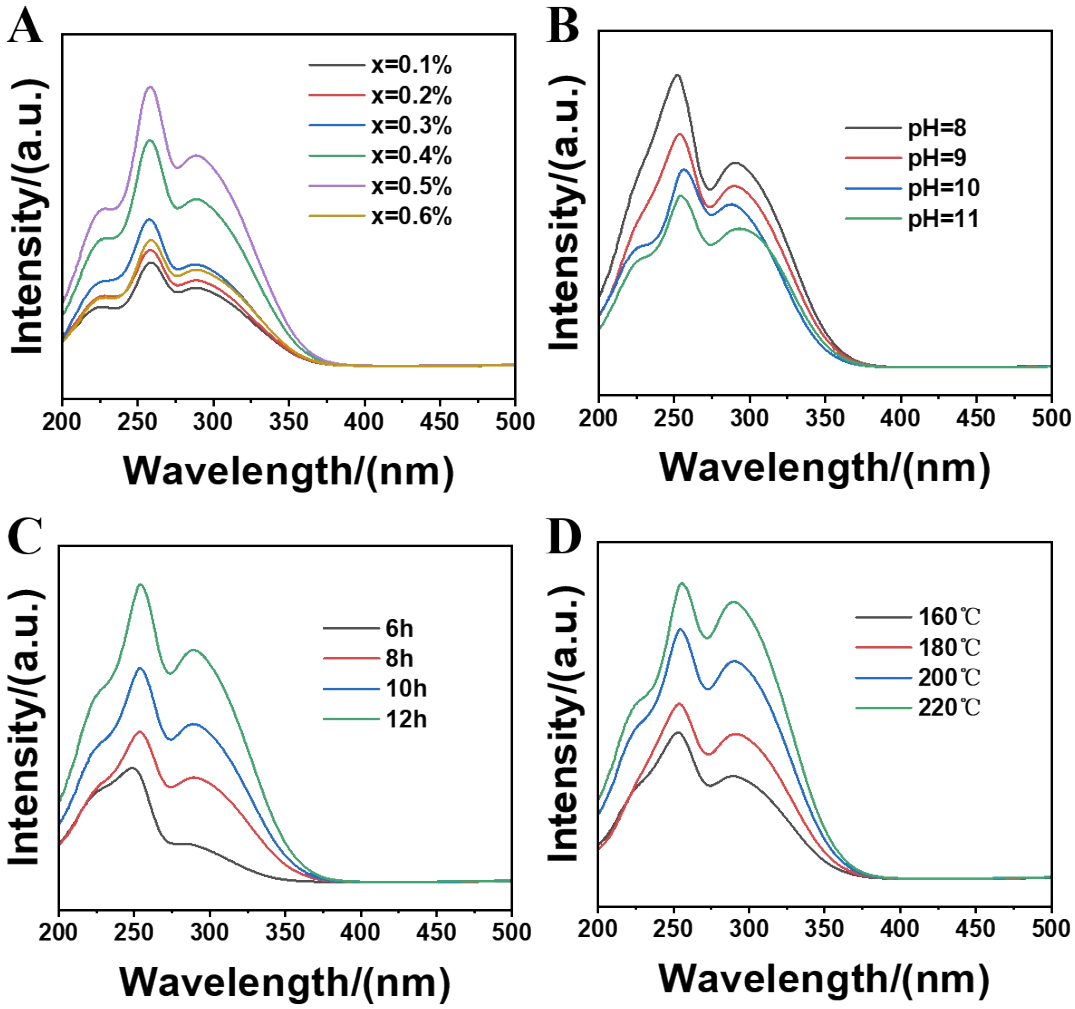

Fig. S2 (A) Excitation spectra of Zn_2GeO_4: xMn^{2+}. (B) Excitation spectra of Zn_2GeO_4: 0.5% Mn^{2+}、0.3%In^{3+} at different pH values. (C) Excitation spectra of Zn_2GeO_4: 0.5% Mn^{2+}、0.3% In^{3+} at different reaction times. (D) Excitation spectra of Zn_2GeO_4: 0.5% Mn^{2+}、0.3% In^{3+} at different reaction temperatures.

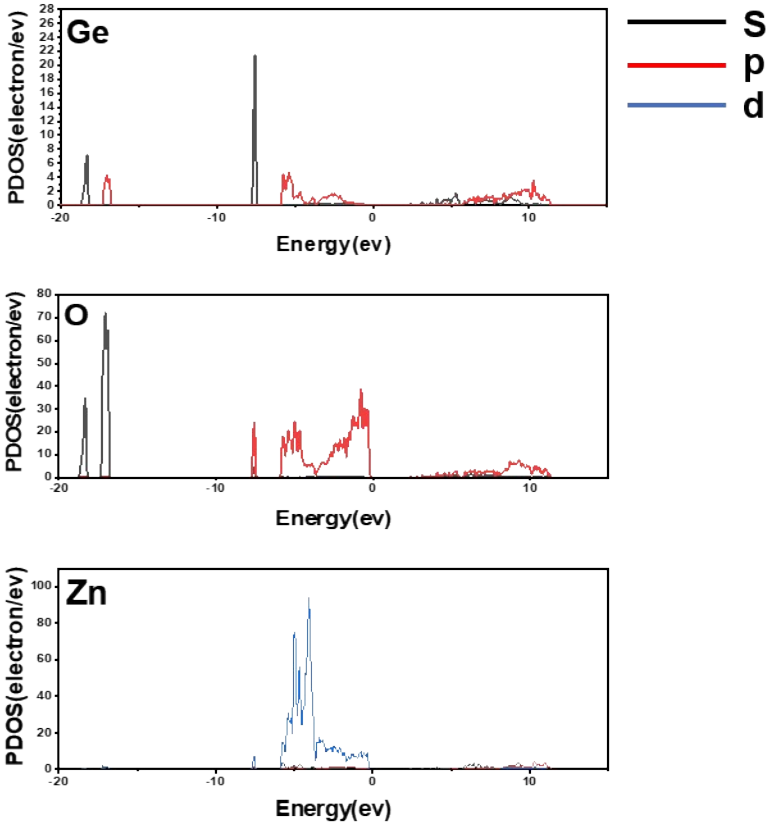

Fig. S3 PDOS of Zn_2GeO_4.

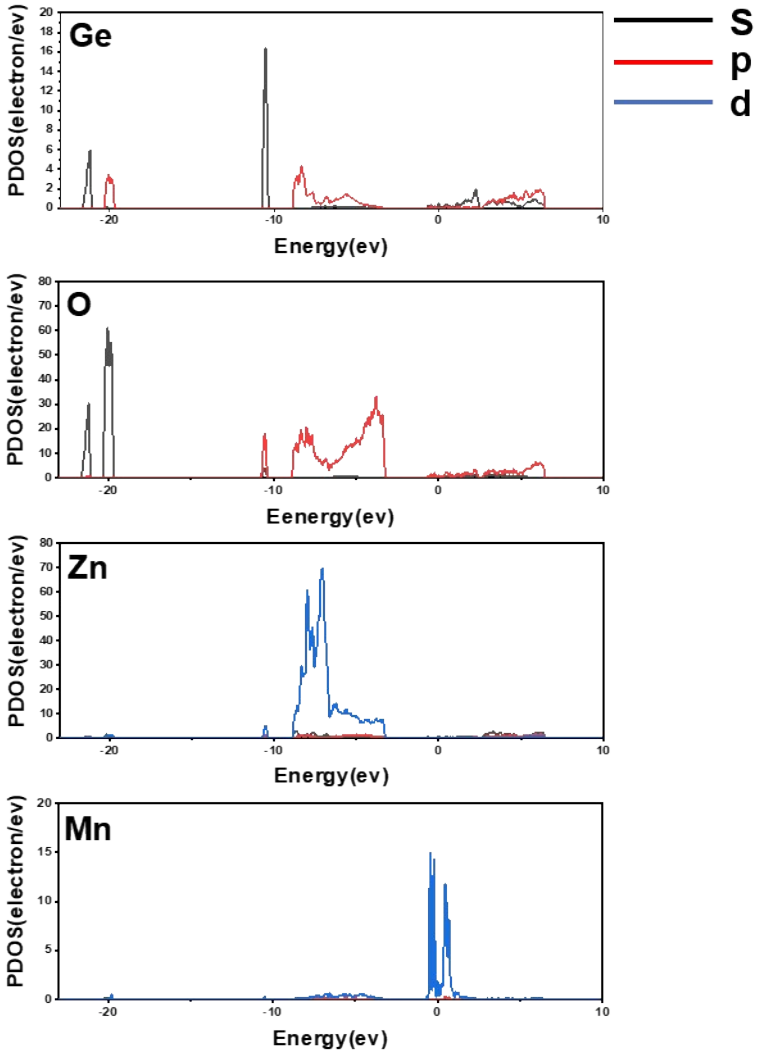

Fig. S4 PDOS of Zn_2GeO_4: Mn^{2+}.

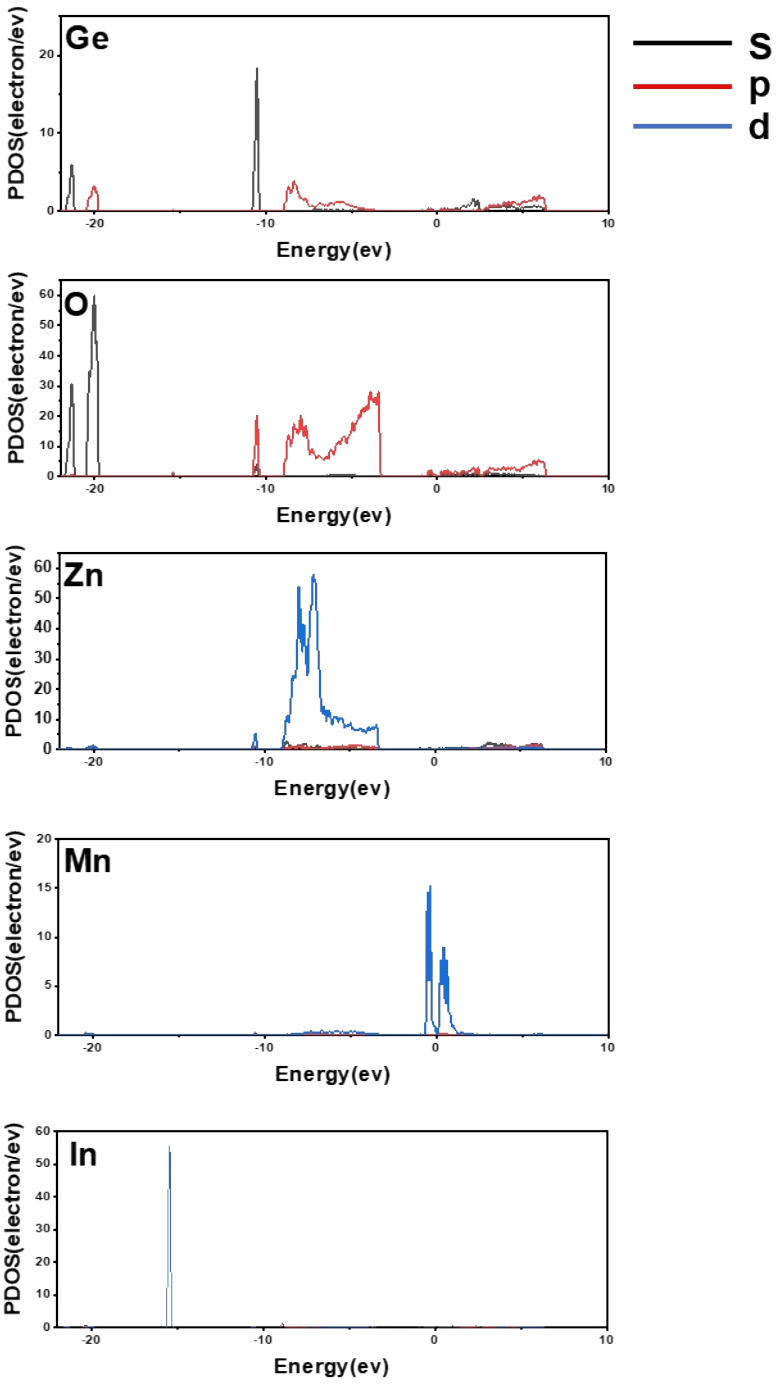

Fig. S5 PDOS of Zn_2GeO_4: Mn^{2+}、In^{3+}.

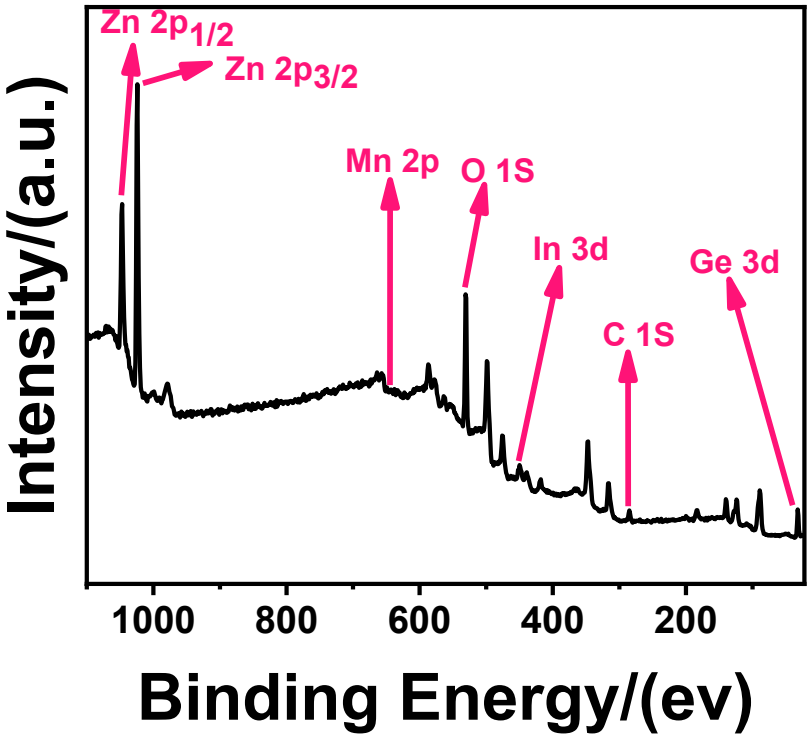

Fig. S6 XPS full spectrum of Zn_2GeO_4: 0.5% Mn^{2+}、0.3% In^{3+}.

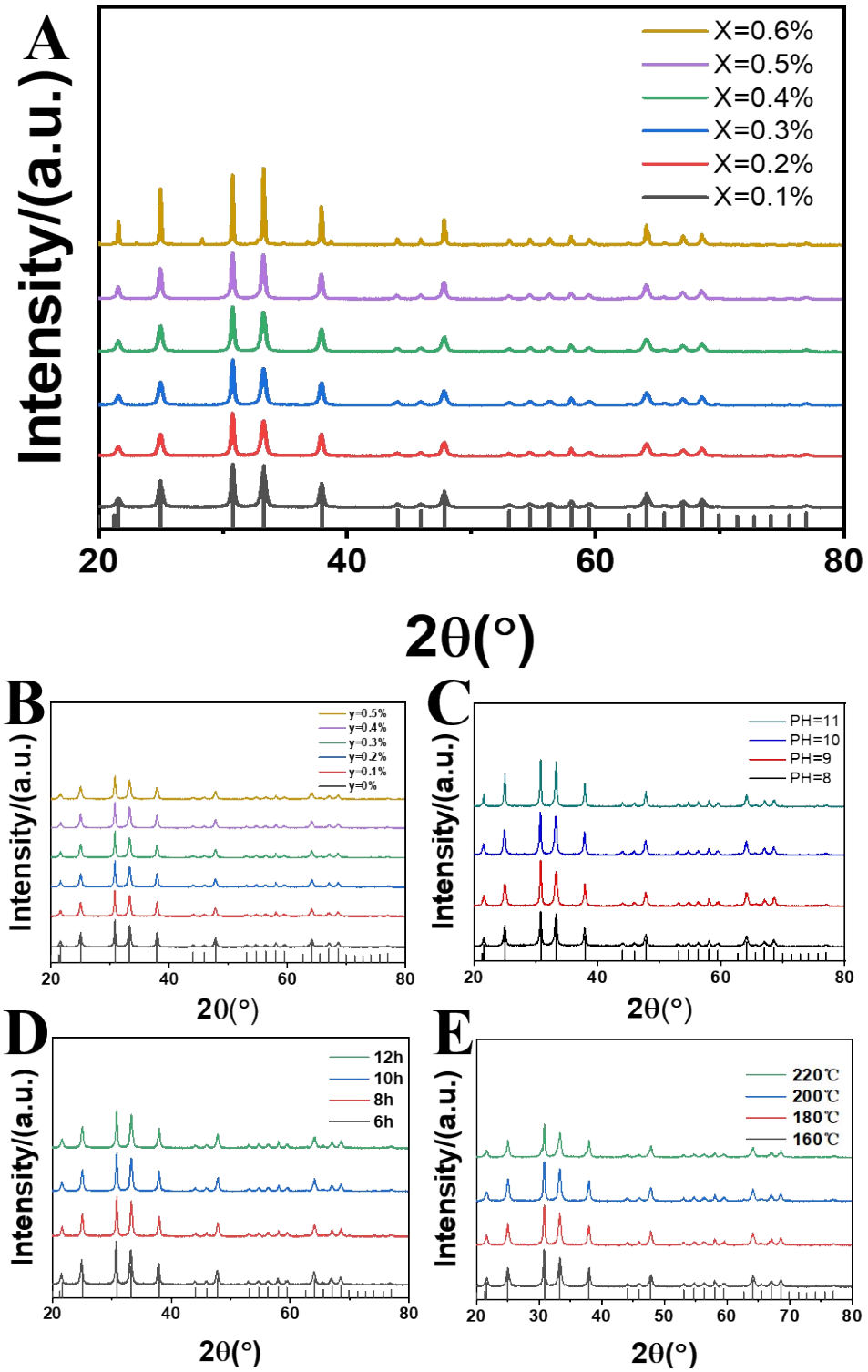

Fig. S7 (A) Zn_2GeO_4: xMn^{2+} XRD diagram.(B) Zn2GeO4: 0.5% Mn^{2+}、YIn^{3+} XRD diagram. (C)XRD diagram of Zn_2GeO_4: 0.5% Mn^{2+}, 0.3% In^{3+} pH optimized. (D)XRD diagram of Zn_2GeO_4: 0.5% Mn^{2+}、 0.3% In^{3+} hydrothermal time optimization. (E)XRD diagram of Zn_2GeO_4: 0.5% Mn^{2+}、 0.3% In^{3+} optimized for hydrothermal temperature.

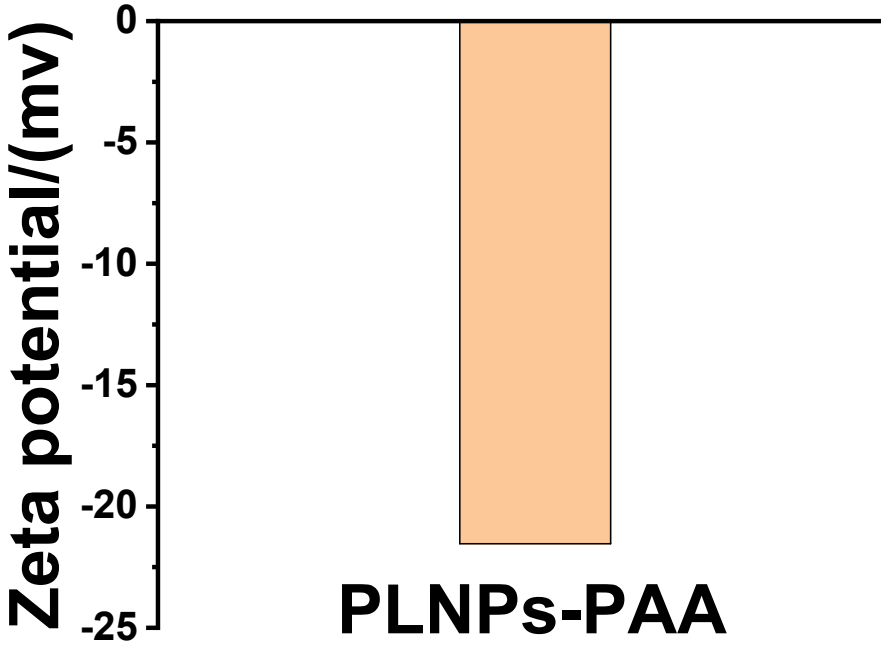

Fig. S8 Zeta potential map of PLNPs-PAA.

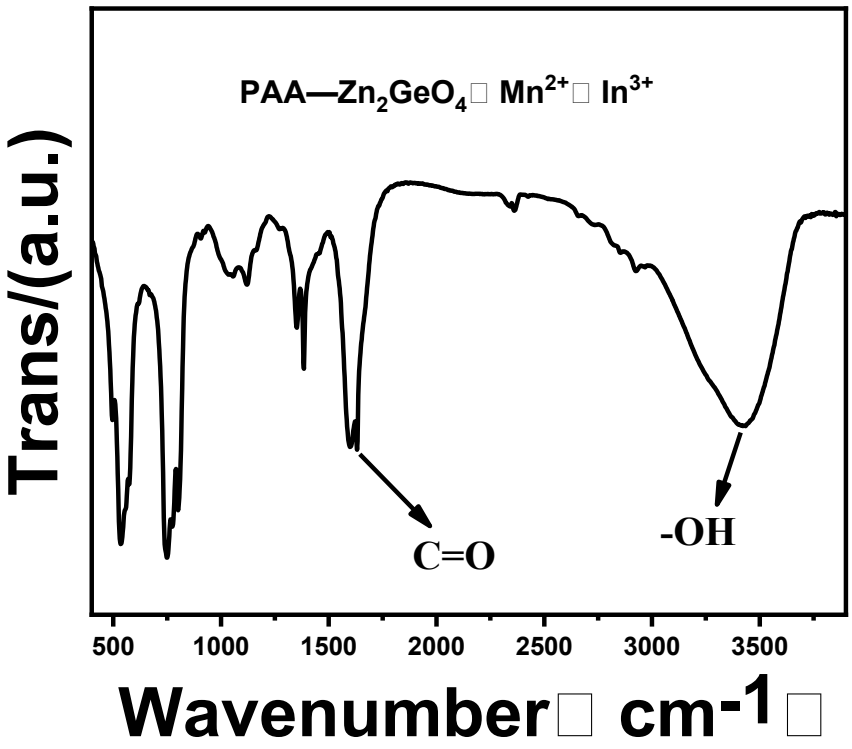

Fig. S9 Infrared map of PLNPs-PAA.