

Supplementary Information

Tunable Broadband Near-Infrared Luminescence from Cr³⁺-Doped Gallium Oxide-Based Phosphors for Advanced Sensing and LED Applications

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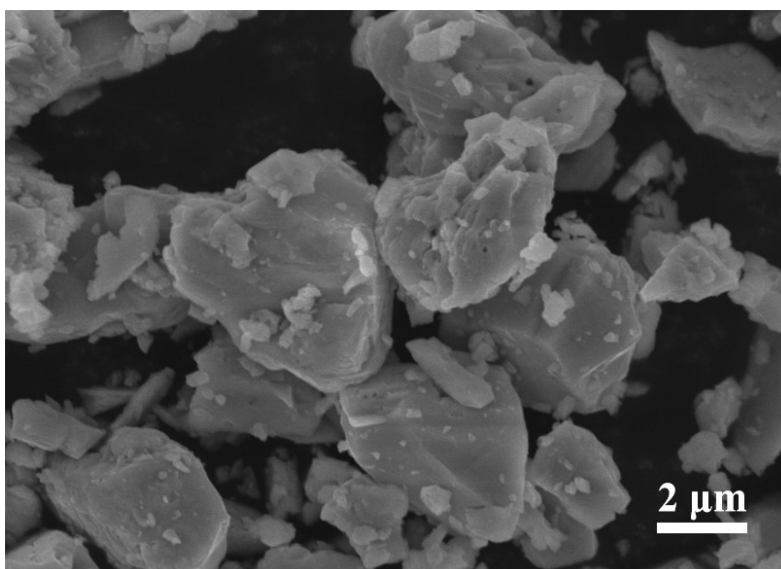


Figure S1. The SEM image of $\text{Ga}_{1.57}\text{Zn}_{0.2}\text{Ge}_{0.2}\text{Cr}_{0.03}\text{O}_3$ phosphor.

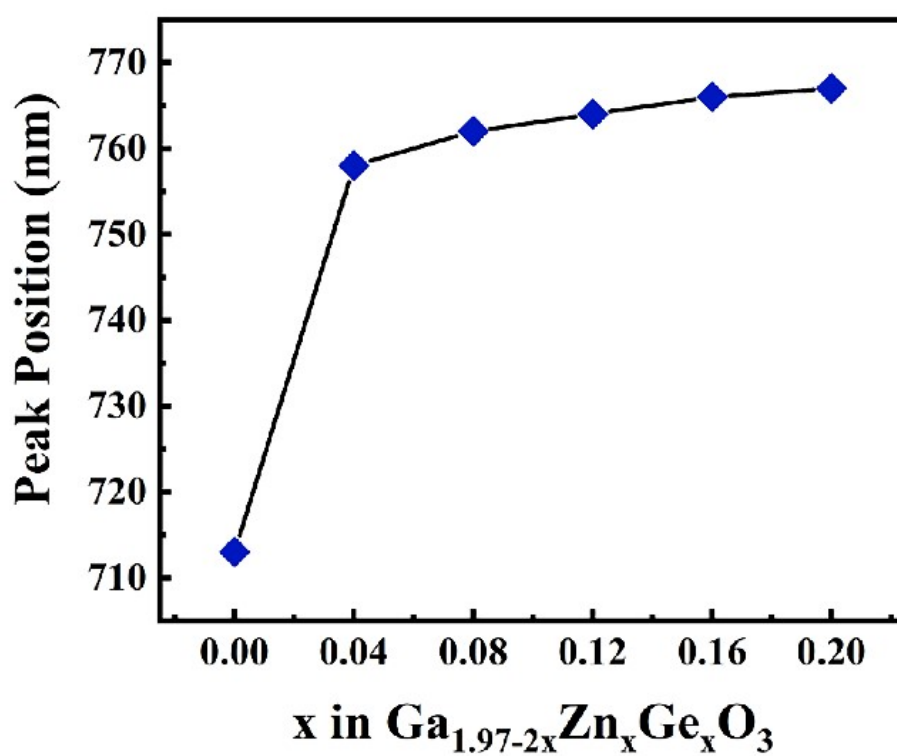


Figure S2. The emission spectra of peak position as a function of x in $\text{Ga}_{1.97-2x}\text{Zn}_x\text{Ge}_x\text{Cr}_{0.03}\text{O}_3$ ($x = 0 - 0.2$) phosphors.

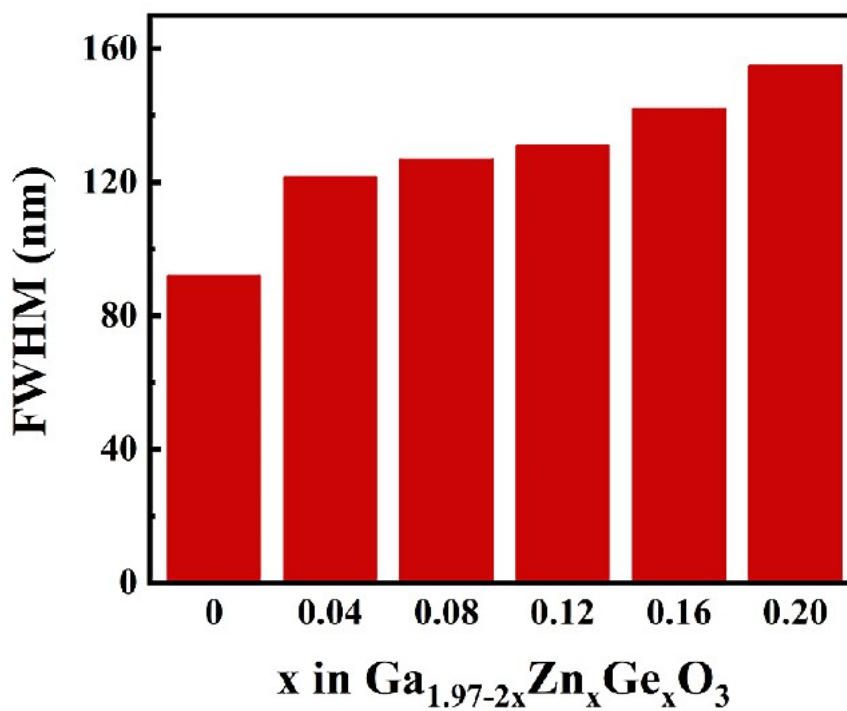


Figure S3. The emission spectra of FWHM as a function of x in $\text{Ga}_{1.97-2x}\text{Zn}_x\text{Ge}_x\text{Cr}_{0.03}\text{O}_3$ (x = 0-0.2) phosphors.

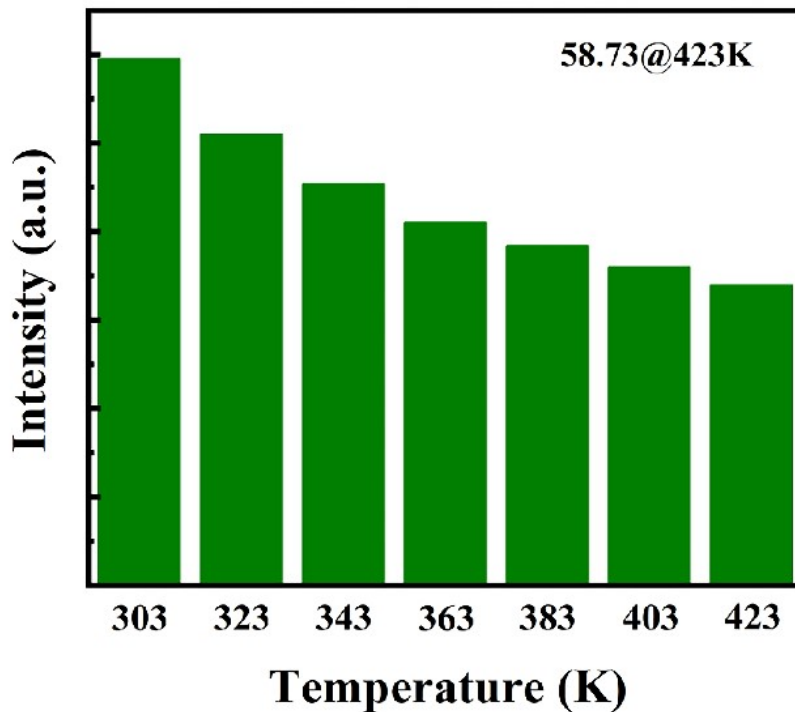


Figure S4. The intensity histograms of $\text{Ga}_{1.57}\text{Zn}_{0.2}\text{Ge}_{0.2}\text{Cr}_{0.03}\text{O}_3$ at temperature ranges of 303 K-423 K.

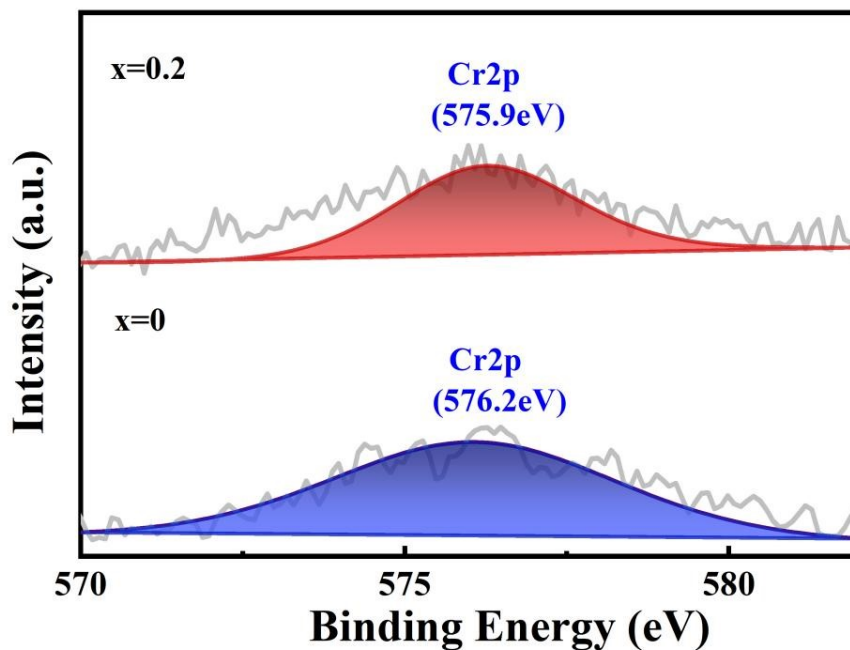


Figure S5. High-resolution Cr 2p XPS core energy level spectrum of $\text{Ga}_{2-2x}\text{Zn}_x\text{Ge}_x\text{Cr}_{0.03}\text{O}_3$ doped with different co-unit concentrations.

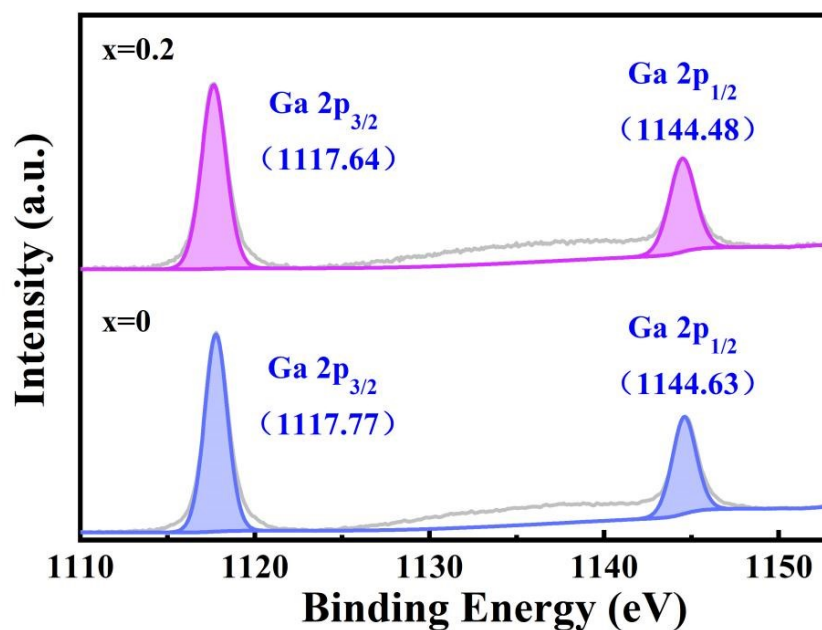


Figure S6. High-resolution Ga 2p XPS core energy level spectrum of $\text{Ga}_{2-2x}\text{Zn}_x\text{Ge}_x\text{Cr}_{0.03}\text{O}_3$ doped with different co-unit concentrations.