

Analysis of Defect Luminescence in Ga-Doped ZnO Nanoparticles

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Abnormal CL emission of GZO synthesized by NI method

As mentioned in the main-text, in the current research, for each sample, CL spectra obtained by using electron beam irradiation were collected at more than 10 different single particles which were randomly selected. The CL spectra collected at most particles showed a spectral morphology similar to those shown in Fig. 4, which were hereafter referred to as “Normal” (N) spectra. However, it should be noted that at some Ga-doped ZnO particles synthesized by the NI method, abnormal spectra (A) different from the others were also observed. A comparison of such spectra with the normal ones was given in Fig. S1. On the right side of the representative

spectra, the SEM images of the particles selected were also provided. In the case of the NI5 sample, the UV emission disappeared at some particles, while the green-red band exhibited a stronger intensity than the Normal one. On the other hand, in the case of NI10, the UV band was shifted toward the lower wavelength, and the bands at 500 nm were clearly enhanced. Such change in the spectral morphology suggests a possible variation of the chemical composition and defects in these GZO particles.

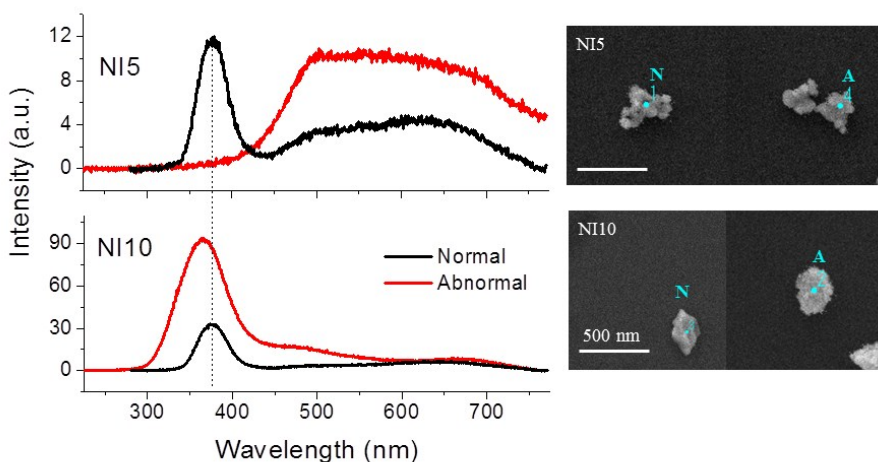


Figure S1. Representative Normal and Abnormal CL spectra obtained at the Ga-doped ZnO single particles synthesized by NI method. On the right of the respective plots, SEM images of the investigated particles that exhibited Normal (N) and Abnormal (A) CL spectra are shown for the NI5, and NI10 GZO samples.