

Using TR-XEOL and XEOL to study the peculiar near-band-edge emission of polar and non-polar MgZnO epi-films

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Abstract

Based on the advantages of the multifunctional TPS 23A X-ray nanoprobe (XNP)¹, one can simultaneously obtain the optical, compositional and structural information through the X-ray excited optical luminescence (XEOL)², X-ray absorption spectroscopy (XAS) and X-ray diffraction (XRD), respectively. In this study, not only XEOL was used to investigate the optical properties of *c*- and *a*-plane MgZnO epi-films, but also the polarization-dependent XAS^{3, 4} with $E \perp c$ and $E \parallel c$ was used to characterize the crystallographic orientations. We observed a peculiar phenomenon that the X-ray irradiation with the nano-focus beam can improve the crystal quality to enhance the intensity of the near-band-edge (NBE), which means that the NBE emission of both MgZnO epi-films will increase rapidly with the X-ray irradiation time. The detail information was observed by time-dependent XEOL to record the variation process. Furthermore, the dynamics of luminescence of both MgZnO epi-films by using TR-XEOL⁵ in the hybrid bunch mode will be reported.

References

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