T2-P029

Correlation between terahertz characteristics and defect states in LTG-InGaAs

박동우[1,3], 김준오[1], 이상준[1], 김창수[1], 이대수[1], 노삼규[1], 강 철[2], 기철식[2], 김진수[3]

[1]한국표준과학연구원 산업측정표준본부, 대전, [2]광주과학기술원 고등광기술원, 광주,
[3]전북대학교 신소재공학부, 전주

Low-temperature grown (LTG) InGaAs epilayers were grown by MBE technique for studying a correlation between terahertz (THz) emission and the intrinsic defects. The 1.2-um-thick Be-compensated LTG-InGaAs epilayers were prepared on SI-InP:Fe substrate at 200-250^{o}C, and subsequently in-situ annealed under As environment at 550^{o}C for 5-30 minutes. The carrier concentration/mobility and the crystalline structure were analyzed by the Hall effect and the x-ray diffraction (XRD), respectively, and the carrier lifetime were determined by the fs time-resolved pump-probe spectroscopy. THz generation from LTG-InGaAs was carried out by a Ti-sapphire laser (800 nm) of a pulse width of 190 fs at a repetition of 76 MHz. Figure shows the spectral amplitude of generated waves in the THz region. As the growth temperature of epilayer increases, the amplitude is enhanced. However, two samples grown at 200^{o}C, as-grown and annealed, show almost no difference in the spectral amplitude. This suggests that the growth temperature is critical in the formation of defect states involved in THz emission. We are now investigating the correlations between the XRD band attributed to defects, the Hall parameter, and the spectral amplitude of generated THz wave. This work was supported by NRF (No. 2007-00011) for GRL project.