

ST-002

<Invited Talk>

Development of GaInP-AlGaInP High Power Red Laser Diodes

김호경¹, 김창주², 최재혁², 배성주², 송근만², 신찬수², 고철기²

¹한밭대학교, ²한국나노기술원

High power, short wavelength red laser diodes (LDs) have attracted significant interests in a variety of fields due to their advantages in terms of reliability, compactness and cost. The higher brightness for human eyes is required, the shorter wavelength like 630 nm is necessary with higher output power. In this respect, LDs are promising as alternative candidates of gas or dye lasers for such applications due to their small size, high optical / electrical power conversion efficiency, robustness and so on. The crystalline quality of GaInP-AlGaInP multiple quantum wells (MQWs) and AlInP cladding layers is a crucial part in the device performance of GaInP red LDs. Here, we first investigated the effect of Si diffusion on the optical properties of GaInP-AlGaInP MQWs grown with different growth temperatures. Secondary ion mass spectroscopy (SIMS) measurements revealed that both the Mg and Si diffusion into MQW active region was significant. To reduce such diffusion, we employed undoped Mg and Si diffusion barrier and could improve the properties. Without both Mg and Si diffusion barriers, no lasing emission was observed. However, lasing emission was observed clearly for the red LDs with both Mg and Si diffusion barriers. We then investigated the temperature dependent optical properties of MQW layers grown with different well thicknesses (6, 8 and 10 nm). When the well thickness was 10 nm, the better crystalline quality was obtained. However, the observed LD performances were similar, probably due to the defects and impurities in the AlGaInP layer. Further investigation with the detailed analyses will be presented later.

Keywords: Red laser diodes, GaInP-AlGaInP

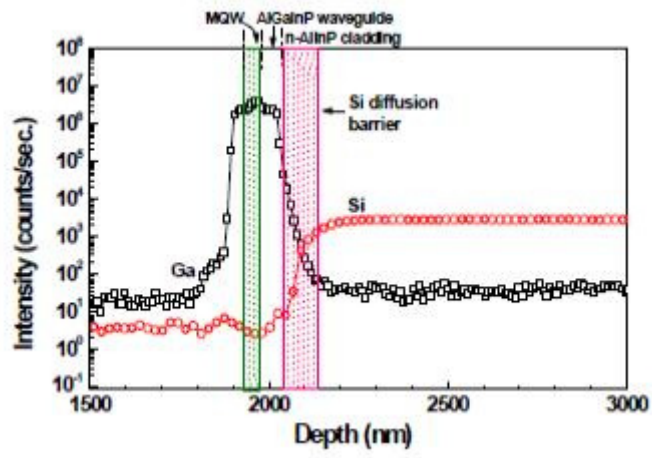


Fig. 1.