

Thermal Annealing Effects on Nonradiative Recombination Parameters of GaInAsSb/GaSb by Means of Photothermal Deflection Technique

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Abstract : We have used Photothermal deflection spectroscopy PTD to investigate the impact of thermal annealing on electronics properties of GaInAsSb/GaSb. GaInAsSb used as an active layer for Vertical Cavity Surface Emitting laser (VCSEL). We have remarked that surface recombination velocity (SRV) from 7963 m / s ($\pm 6.3\%$) to 1450 m / s (± 3.6) for as grown to sample annealed for 60 min. Accordingly, Force Microscopy images analyses agree well with the measure of surface recombination velocity. We have found that Root-Mean-Square Roughness (RMS) decreases as respect of annealing time. In addition, we have that the diffusion length and minority carrier mobility have been enhanced according to annealing time. However, due to annealing effects, the interface recombination velocity (IRV) is increased from 1196 m / s (± 5) to 6000 m/s (5%) for GaInAsSb in respect of annealed times.

Keywords : nonradiative lifetime, mobility of minority carrier, diffusion length, Surface and interface recombination velocity

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