Photonic-Corral-Mode Quantum Ring Lasers investigated by laser beam induced current technique

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Ultralow threshold microcavity lasers are ideal candidates for high-density optical interconnect light sources. The PQR lasers offers the following advantages for extremely high- density emmiter source chip, over other semiconductor lasers presentely available: a photonic quantum corral effect leads to naturally- born quantum wire behaviours for imminently recombinant carriers; the μA- nA threshold current capabilities mean kilo to mega PQR chip; $\sqrt{T}$ - dependent spectral red shifts are smaller at high operating temperatures, allowing uniform and reliable chip emission with minimal temperature sensitivities. By using laser beam induced current technique technique in laser scanning microscopy we investigated the photocurrent in the laser structure.

For our investigatios we used a PQR mesa structure, which is fabricated using the Chemically Assisted Ion Beam Etching (CAIBE) process (1). The experimental setup was based on confocal laser scanning microscope equipped with a He-Ne laser operating at 633 nm and 50 mW maximum output power. The laser beam was focused through a microscope to a spot approximately 300 nm in diameter on the laser surface. It was used an objective with 20X and 0,4 N.A. Chopping the light at 400 Hz and amplifying the photocurrent with lock-in amplifier the noise was eliminated. To change the laser power we used neutral density filters.

The objective of our study is to make a connection between photon confinement and photocurrent confinement.

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