J Laser Opt Photonics 2017, 4:4 (Suppl)
DOI: 10.4172/2469-410X-C1-018

Strong exciton-photon coupling in gallium nitride micro-rods

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Light-matter interaction has been attracted huge research interest now a day. Polaritons (half-light-matter bosonic quasiparticles), resulting due to strong light-matter coupling enables some interesting features like Bose-Einstein condensation in solid state, polariton lasing, quantized vortices, slow light applications etc. These interesting features are due to low effective mass of polaritons (10^{-4} orders of free electron mass). Among the applications, polariton lasing has attracted research interest as this lasing could be achieved easily at room temperature and population inversion is not required for this lasing action. Another advantage of polariton lasin is that the lasing threshold is lower than conventional lasing. Light matter coupling has been reported mainly in quantum well kind of structures to confine light in the cavity with high quality Bragg mirrors. To avoid Bragg mirrors, materials with large intrinsic oscillator strength such as ZnO, GaN, CdS has been chosen to confine light within cylindrical cavity (nano/micro rods kind of geometry). Several reports on strong coupling and polariton lasing has been reported in ZnO at room temperature and elevated temperature. Though there are several reports on strong coupling in GaN quantum well structures but very few reports on strong coupling in GaN nano/micro rods without Bragg mirrors till now. In this report, I will discuss strong exciton photon coupling in GaN microrods without Bragg mirrors by exciting with both continuous wave and pulsed laser at room temperature. Polariton lasing resulting from microrods when excited by pulsed laser will also be discussed.

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