

FABRICATION OF TWO DIMENSIONAL PHOTONIC CRYSTAL MICRO AND NANOCAVITIES: FROM ULTRA LOW THRESHOLD LASERS TO SOLID STATE BASED OPTICAL QUANTUM LOGIC

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Two-dimensional photonic crystal lasers have been fabricated on III-V semiconductor slabs. Tuning of the spontaneous emission in micro and nanocavities has been achieved by accurate control of the slab thickness [1]. Different structures based in the coupling of light between nanocavities have been fabricated, like the Suzuki-phase [2], the hybrid lattice [3] or coupled-cavity ring-like resonators [4]. Laser emission has been obtained by pulsed optical pumping with very low power density. The capability of confining light in very small dimensions allows to obtain enhanced effects on cavity-QED. Photonic crystal cavities fabricated on self-assembled quantum dot active material (like quantum rings and quantum wires) have been fabricated for the first time with special attention to the control of the Purcell factor and the emission wavelength. These structures open new ways for single emission of photons, enhanced emission of entangled photon pairs and optical quantum gates.

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