

Fabrication of two dimensional photonic crystal microcavities on InAs/GaAs quantum rings for entangled emission of photons

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A two dimensional photonic crystal microcavity has been fabricated using InAs on GaAs quantum ring nanostructures. The sample is grown by molecular beam epitaxy and comprises 500nm of a sacrificial layer ($\text{Al}_{0.7}\text{Ga}_{0.3}\text{As}$), 80 nm of GaAs, and 77,5 nm of GaAs. A layer of Quantum Rings (QRs) is obtained from a layer of quantum dots (QD). The QDs are grown by deposition of 1.7 InAs monolayers (ML). Details of the epitaxial growth to obtain QR formation will be presented. QRs have an electronic structure that may enhance the emission of entangled photons. Photonic crystal microcavities on suspended membranes have been fabricated. In order to enhance the lifetime of photons inside the microcavities, they have been tuned to enhance the Q-factor (Fig.1). These structures open new ways for single emission of photons and enhanced emission of entangled photon pairs.

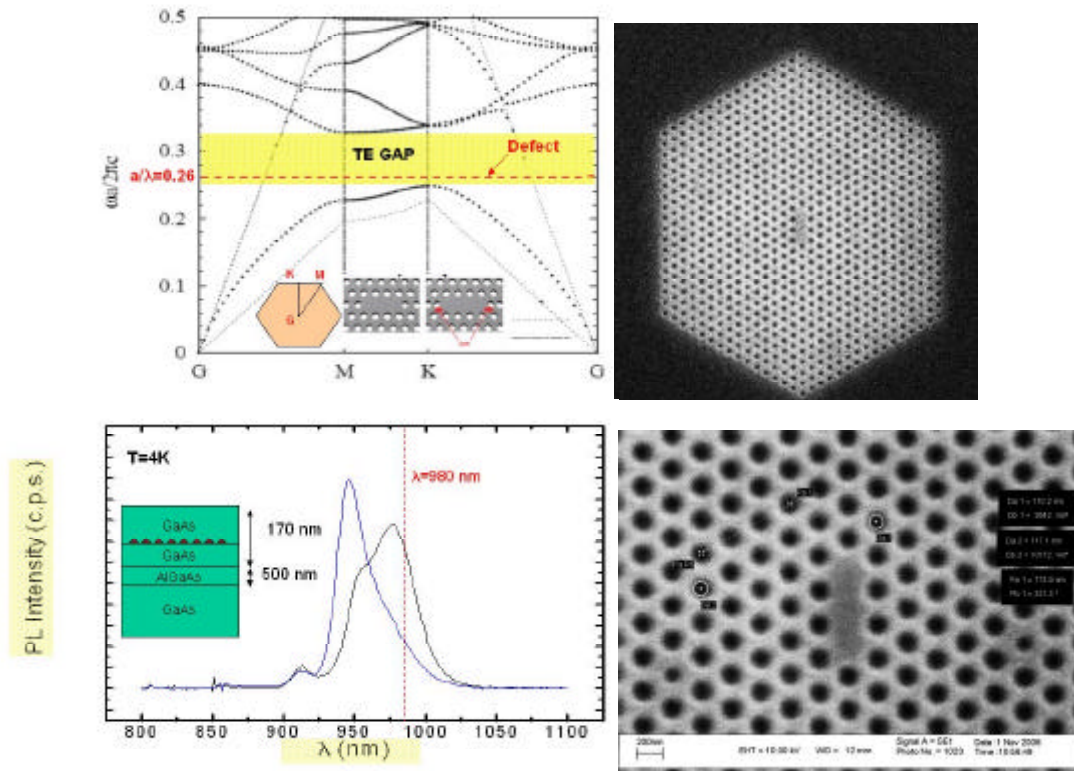


Fig.1. Left panel top: calculation of the mode defect of the photonic crystal microcavity. Top right: SEM micrograph of the fabricated structure. Bottom left: Low temperature photoluminescence measurement of the sample. Bottom right: SEM micrograph of the Noda-type microcavity.