

Fabrication of GaAs photonic crystals slab cavities for quantum optics

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Photonic crystal slab cavities are promising candidates for the implementation of spontaneous emission control. Recently photonic crystal slab cavities with a quality factor around a million [1] have been obtained, in combination with a modal volume of the order of $(\lambda n)^3$. This value of the quality factor strongly depends on the cavity design but also on the dry etching process during which holes are drilled in the suspended membrane. We are exploring two techniques that can be used to perform such structure: Reactive Ion Etching (R.I.E.) and Inductively Coupled Plasma (I.C.P.). We will present our preliminary results obtained on double heterostructure nanocavity, using both techniques.

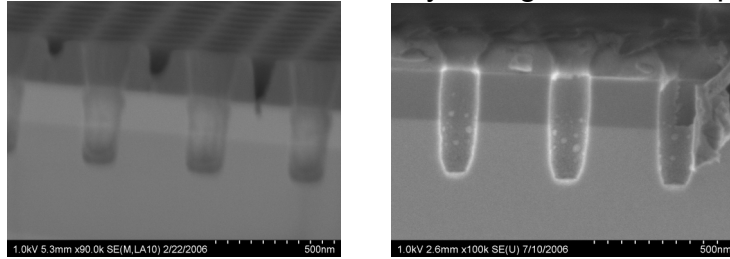


Fig 1: R.I.E Etching (left) and I.C.P. etching (right) of 140nm diameter in a GaAs membrane.
From the top to the bottom: Si_3N_4 mask, GaAs layer (180nm) and AlGaAs sacrificial layer

[1] B.S. Song, S. Noda, T. Asano and Y. Akahane, Nat. Mater. 4, 207 (2005)