

Focused Ion Beam (FIB) Processing of 2D Photonic Crystals in Silicon-On-Insulator

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FIB processing of nanophotonic devices is becoming an important tool for rapid prototyping during design stages[1]. The drawback is the damage induced by the high energy Ga^{2+} beam, however, with techniques such as Gas Assisted Etching and post-etch annealing device performance can be recovered. This paper presents what is believed to be the first example of in-plane optical characterisation of FIB etched PhCs on SOI. The SOI structure is particularly attractive for FIB processing since only very shallow holes typically 200-300nm deep are required in the Si layer. Figure 1(a) shows a FIB picture of a PhC device etched into 205nm of Si over $3\mu\text{m}$ of SiO_2 . The whole device including $150\mu\text{m}$ long input and output waveguides has been etched using FIB. Figure 1(b) shows a zoom-in showing the excellent quality of the holes. The devices were then characterised using an in-plane system with a fibre lens at the input and microscope object at the output. Figure 1(c) shows the upper wavelength band edges for two different PhC structures. The band edges are reduced in depth by FIB damage effects and post-etch annealing recipes are now being investigated to obtain improved performance.

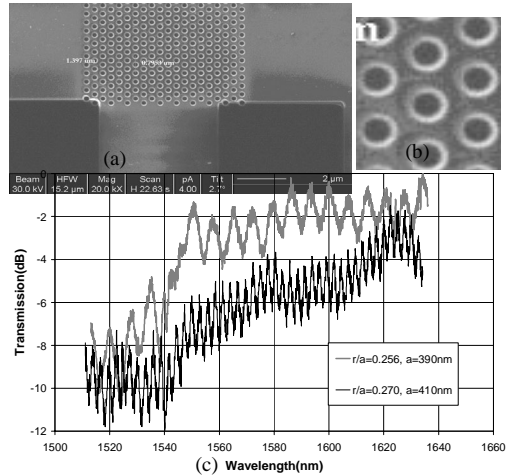


Fig 1 : (a) Top view of FIB etched SOI (b) Zoom in (c) Measured band edges

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