

Low loss two dimensional InP-based photonic crystal waveguides

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Two dimensional (2D) photonic crystals (PhCs) in InP-based materials are attractive candidates for applications in integrated circuits. For most applications reaching low losses in 2D PhC devices is one of the most important outstanding challenges to make them beneficial to integrated circuits. So far two types of 2D PhC are commonly investigated in literature: membrane type and low index contrast based structures. We will report on the optical characterization by an endfire technique of 2D PhC waveguides etched through an InP-based waveguide by inductively coupled plasma etching using SiCl₄ chemistry [1]. The PhC waveguides were either butt-coupled and/or coupled by a PhC-based taper to the ridge waveguide. The propagation losses of the PhC waveguides were determined by using Fourier analysis [2] of the transmission spectrum through PhC waveguides. Despite the small light absorption in the measured short W3 PhC waveguides (*i.e.* 3 missing rows of holes in direction) an upper limit of propagation losses of 84 dB/cm was obtained. These values are amongst the lowest values reported on low index contrast based 2D PhC waveguides so far. Measurements on longer PhC waveguides will be presented to determine more precisely the propagation losses.

[1] F. Pommereau, L. Legouézigou, S. Hubert S., S. Sainson, J-P. Chandouineau, S. Fabre, G-H. Duan, R. Ferrini, B. Lombardet, and R. Houdré, *J. Appl. Phys.*, **95**, 2242 (2004).

[2] D. Hofstetter, and R.L. Thornton, *Optics Lett.*, **22**, 1831 (1997).