

Characterization of SOI photonic crystals tapers by Scanning Near-Field Optical Microscopy (SNOM)

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Photonic bandgap structures are very promising for the integration of optical functions at the nanoscale level and particularly 2D structures perforated in a slab waveguide. An efficient coupling technique between dielectric and planar photonic crystals (PC) waveguides was recently demonstrated in [1]. This technique consists in the introduction of a localized defect in a PC taper, so as to reduce the coupling losses between the two kinds of guides. The studied structure, fabricated with deep UV lithography, is composed of a 3 μ m-wide dielectric waveguide coupled to a single-line defect PC waveguide, on SOI. Two types of tapers (with or without localized defect) were compared. A coupling efficiency of 44% was measured for the taper without defect. This value reaches 75% with the defect.

A SNOM study was realized in order to correlate this increase with the taper structure. The SNOM allows a local mapping of the electromagnetic field of a component under working conditions, with a resolution less than the wavelength. The field maps clearly show a cavity effect related to the defect, leading to a higher coupling efficiency. At 1.55 μ m, twice more signal is coupled into the PC waveguide with the defect than without the defect. Important out-of-plane losses are observed in the structure with no defect. Those results are compared to 3D-FDTD simulations and discussed in this presentation.

[1] P. Sanchis and al, IEEE Photon. Technol. Lett, vol.16, n° 10, p. 2272-2274 (2004)

Session 4: Photonic crystals, waveguides and microcavities**Session Chair: N. Daldosso**

D S4 01	invited 16:15	NANOCRYSTALLINE SILICON WAVEGUIDES FOR NANOPHOTONICS <u>J. Valenta</u> (a)*, T. Ostatnický (a), P. Janda (a), E. Skopalová (b), I. Pelant (b), R.G. Elliman (c), and R. Tomasiunas (d) (a) Department of Chemical Physics & Optics, Faculty of Mathematics & Physics, Charles University, Prague, Czech Republic (b) Institute of Physics, Academy of Sciences of the Czech Republic, Prague, Czech Republic (c) Electronic Materials Engineering Department, Research School of Physical Sciences and Engineering, Australian National University, Canberra, Australia (d) Institute of Materials Science and Applied Physics, Vilnius University, Vilnius, Lithuania
D S4 02	16:45	Negative refraction devices in photonic crystals circuits <u>Vito Mocella</u> (a), Principia Dardano (a,b), Luigi Moretti (a,c) and Ivo Rendina (a), (a) Istituto per la Microelettronica e Microsistemi – Consiglio Nazionale delle Ricerche (IMM-CNR) – Sez. di Napoli, via P. Castellino 111, 80131 Napoli, Italy; (b) Dip. Scienze Fisiche, Università degli Studi di Napoli “Federico II”, via Cintia, I-80126, Napoli, Italy; (c) Università “Mediterranea”, Località Feo di Vito, 89060 Reggio Calabria, Italy
D S4 03	17:00	Optical harmonic generation in amorphous silicon nitride microcavities <u>F. Gesuele</u> 1, S. Lettieri 1, P. Maddalena 1, F. Giorgis 2, C. Ricciardi 2, V. Ballarini 2, 1 COHERENTIA CNR- INFN & Dipartimento di Scienze Fisiche, Università di Napoli “Federico II”, Via Cintia, I-80126 Napoli, Italy, 2 Dipartimento di Fisica, Politecnico di Torino, C.so Duca degli Abruzzi 24, I-10129 Torino, Italy
D S4 04	17:15	Characterization of SOI photonic crystals tapers by Scanning Near-Field Optical Microscopy (SNOM) <u>D. Néel</u> (1), T. Benyattou (1), P. Sanchis (2), J. Marti (2), W. Bogaerts (3), P. Dumon (3), R. Baets (3) 1) Laboratoire de Physique de la Matière, INSA de Lyon, 69621 Villeurbanne Cedex, France 2) Nanophotonics Technology Center, Universidad Politécnica de Valencia, 46022 Valencia, Spain 3) IMEC, Ghent University, Department of Information Technology, B-9000 Ghent, Belgium
D S4 05	17:30	Growth of opals on Penrose-like patterns <u>Nicolas Stenger</u> , Jean-Luc Rehspringer and Charles Hirlimann Institut de Physique et de Chimie des Matériaux de Strasbourg, UMR 7504 CNRS-ULP 23 rue du Loess, 67000 Strasbourg Cedex, France
D S4 06	17:45	Enhanced Er ³⁺ emission in silicon-on-insulator photonic crystal waveguides <u>M. Galli</u> *, A. Politi, M. Belotti **, D. Gerace, M. Liscidini, M. Patrini, L.C. Andreani Dipartimento di Fisica “A. Volta” Università di Pavia, via Bassi 6, 27100 Pavia, Italy; M. Miritello, A. Irrera, F. Priolo, MATIS CNR-INFN and Dipartimento di Fisica e Astronomia, Università di Catania, Via S. Soia 64, 95123 Catania, Italy Y. Chen Departement de Chimie, Ecole Normale Supérieure, 24 Rue Lhomond, 75231 Paris Cedex 05, France and Laboratoire de Photonique et de Nanostructures, CNRS, Route de Nozay, 91460 Marcoussis, France
D S4 07	18:00	Optical properties SRSO/SiO ₂ multilayers based planar microcavities <u>F. Goubilleau</u> , A. Belarouci and R. Rizk SIFCOM, UMR CNRS 6176, ENSICAEN, 6 Bd Maréchal Juin 14050 Caen Cedex.
D S4 08	18:15	Si-based two-dimensional photonic crystals coupled to one-dimensional Bragg mirrors X. Li, <u>P. Boucaud</u> , X. Checoury, M. El Kurdi, S. David, S. Sauvage, N. Yam, F. Fossard, D. Bouchier Institut d’Électronique Fondamentale UMR CNRS 8622 Bâtiment 220, Université Paris-Sud 91405 Orsay, France J. M. Fédéli CEA-LETI 17 Rue des Martyrs 38054 Grenoble Cedex France V. Calvo, E. Hadji, A. Salomon CEA-DRFMC 17 Rue des Martyrs 38054 Grenoble Cedex France



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