Theoretical and experimental study of the Suzuki-phase photonic crystal lattice by angle-resolved photoluminescence spectroscopy

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A complete theoretical and experimental analysis of the photonic band structure for the Suzuki-phase lattice is presented. The band diagrams were calculated by two dimensional plane wave expansion and three dimensional guide-mode expansion methods. Angle resolved photoluminescence spectroscopy has been used to measure the emission of the photonic crystal structure realized in active InAsP/InP slabs. Photonic bands with a very low group velocity along an entire direction of the reciprocal lattice have been measured, which may have important applications on the future photonic devices. The results are in very good agreement with the calculated photonic bands [1]. Defect modes produced by defect microcavities in the Suzuki-phase lattice have also been explored. This method opens new lines to explore the band diagram dealing with the photoluminescence emission spectra of photonic crystal lattices.

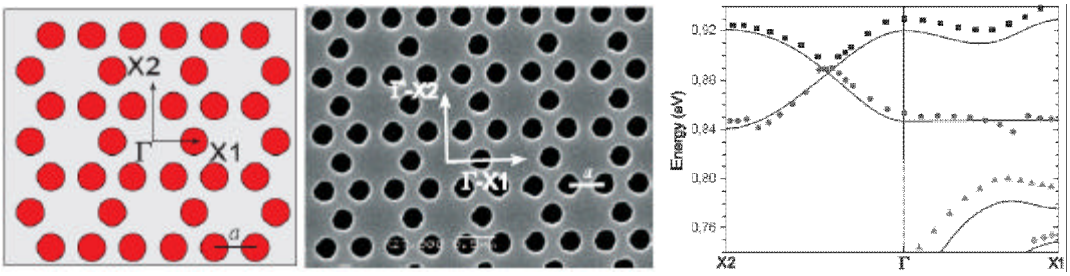

Fig.1. Left panel: layout of the Suzuki-phase lattice. Center: SEM micrograph of the fabricated structure. Right: Band dispersion measurement by angle-resolved photoluminescence spectroscopy.

[1] A. R. Alija L. J. Martínez, P. A. Postigo, J. Sánchez-Dehesa, M. Galli, A. Politi, M. Patrini, L.C. Andreani, C. Seassal and P. Viktorovitch, submitt. to *Optics Express*.