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Optical and magneto-optical properties of 1-D dielectric and magnetic photonic crystals. M.D. HUANG, Y.H. LU, P.J. KIM, S.Y. PARK, Y.P. LEE, Quantum Photonic Science Research Center and Department of Physics, Hanyang University, Seoul, 133-791 Korea — The optical properties of one-dimensional (1-D) photonic crystals (PCs) and magnetic PCs (MPCs), composed of dielectric TiO_2 and Al_2O_3 as well as magnetic Bi:YIG layers deposited on a glass substrate, are investigated in this work. The structure of dielectric 1-D PCs was optimized and a narrow omni – photonic bandgap (PBG) is found away from the designed wavelength. When a Bi:YIG layer with an optical thickness of quarter wavelength is inserted, no defect mode is found within the PBG despite the structural defect. However, when the thickness becomes half wavelength, a defect mode can be obtained at the designed wavelength, revealing the localization of light. More magnetic defect layers induce correspondingly more defect modes within the PBG. Large Faraday rotation angles, indicating strong magneto-optical (MO) effects, are obtained at the defect modes in the MPCs. A considerable amount of coupled light, whose polarization is perpendicular to that of incident light, confirms the enhanced MO effects at the defect modes.

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