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Tunable photonic crystals with nonlinear composite materials[1]
KIN WAH YU, Chinese University of Hong Kong, Shatin, NT, Hong Kong, J. P. HUANG, G. WANG, Fudan University, Shanghai, China — Photonic crystals (PCs) are periodic dielectric structures that are designed to control the flow of electromagnetic (EM) waves. The main attraction of PCs is the existence of photonic band gaps, for frequencies within which the propagation of EM waves can be forbidden leading to many promising applications in the areas of computing and communication for their advantages over electronics. In this work, we report a novel class of tunable photonic crystals consisting of multilayers of noble-metal nanoparticles in dielectric composites with nonlinear responses [1]. For such PCs, precise tunability of photonic band gaps can be achieved by choosing appropriate pump AC or DC electric fields [2]. Moreover, we study the dynamics of Bloch oscillation in such PCs so as to realize terahertz radiation which is relevant in medical physics.

[1] J. P. Huang, K. W. Yu, Phys. Rep. **431**, 87 (2006).
[2] G. Wang, J. P. Huang, K. W. Yu, Appl. Phys. Lett. **91**, 191117 (2007).

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