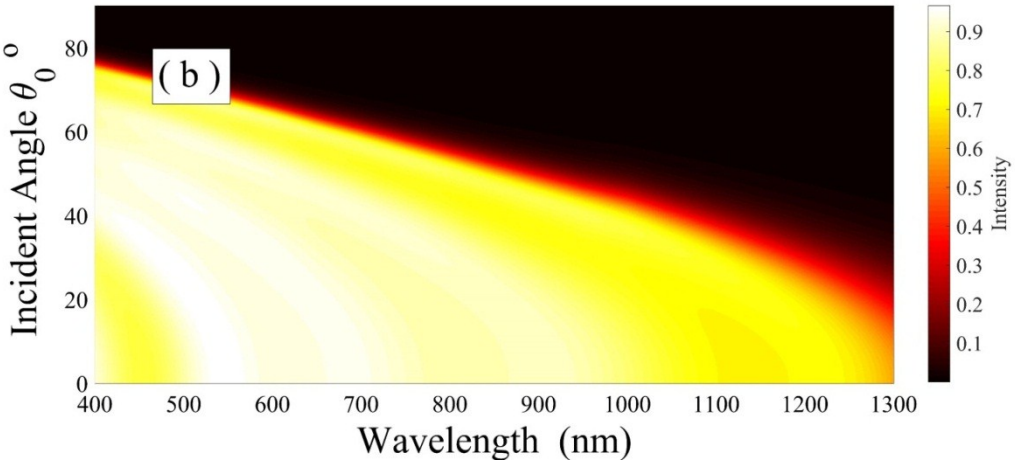
New type of periodic and quasi periodic one-dimensional photonic crystal as a novel smart window

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Abstract

The controlling of the electromagnetic waves propagation has played an essential role in recent technology. In this talk, we present a novel type of smart window using the one-dimensional photonic crystals. The present idea is depending on the controlling of the transmittance values based on the angle of incidence of the electromagnetic waves. We have investigated the transmittance of the proposed novel type of smart window that promising features in different applications based on the two-fluid model and the transfer matrix method. The numerical results show that our design has a great ability to control the propagation of the incident electromagnetic waves of wavelengths from visible light to IR. Moreover; it has high sensitivity to the variation of the angle of incidence. At small values of the angle of incidence, most of visible light and IR are transmitted. As the angle of incidence increases to certain values, the blocking of IR is investigated. In addition, the transmittance values could be optimized depending on different parameters such as the operating temperature and the thicknesses of the constituent materials. Wherefore, our design could be desirable as a smart window. Thus, it could be helpful in the process of power saving especially in the in space exploration and satellites.



Keywords*: photonic crystals, smart window, optical properties, optics, TMM*

Professional Biography (100-150 words)

Arafa H Aly holds a doctoral degree in physics from University of Cairo, Egypt. Prof Arafa Aly joined Cairo University, Beni-Suef branch, physics department in January 1995 as an assistant lecturer of physics. He was a lecturer from 1999 to 2007, and associated professor from 2007 to 20012. In 2012 he became full professor in physics; In 2012 Professor Arafa was elected as the chair of the Department of Physics till now. Professor Arafa was a postdoctoral fellow of physics at ICTP, Trieste, Italy 2001, Seoul national university, South Korea 2004 and 2005 in AUB, Lebanon. In 2006-2008 was a research professor in Chonnam national university in Korea. Within 2008 was a research professor in Zaragoza University in Spain. Also Prof Arafa was a research professor part time in American University of Cairo from 2009-2014. He has a distinguished 22-years career in mesoscopic systems, photonic crystals, phononic crystals, solar energy, materials and photonics research. He attended and organized more than 33 conferences from 2001 till now. He has published more than 105 technical papers and reports in good review journals and good impact factors



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