

# Theoretical Investigation on Photonic Bandgap of Nesting Complex-period Photonic Crystals

Yu. Han, and Kai. Xie,

Department of Materials Engineering and Applied chemistry, National University of Defense Technology, Changsha, Hunan, China.

The photonic bandgap of a new 2D nesting complex-period (NCP) structures (Fig 1.) were theoretically investigated. The objective of the Investigation was to find out the difference of the PBG between the new NCP structures and simple-period (SP) structures, and then to ascertain the effect of complex period and the suitable application of them.

Optical responses were calculated for air or PLZT pillars In porous alumina. Fill ratio In calculation ranged between 0.17 to 0.46. Calculation revealed that the PBG of NCP structure was effected by both fill ratio of outside period (R/D) and fill ratio of inside period (r/d). And the contributions of them are different. When R/D of NCP was the same as the fill ratio of SP, because there were Inside periods In NCP structure, the PBG of NCP departed a lot from that of SP, and the width of PBG of NCP was much less than that of SP (Fig 2). In addition, when R/D was fixed, the more r/d was, the longer wavelength of PBG was, which differed from SP.

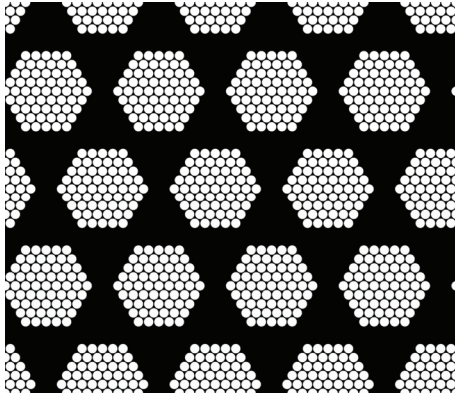


Fig1. new 2D NCP structures. The fill ratio of outside period (R/D) was 0.36, the fill ratio of Inside period (r/d) was 0.46.

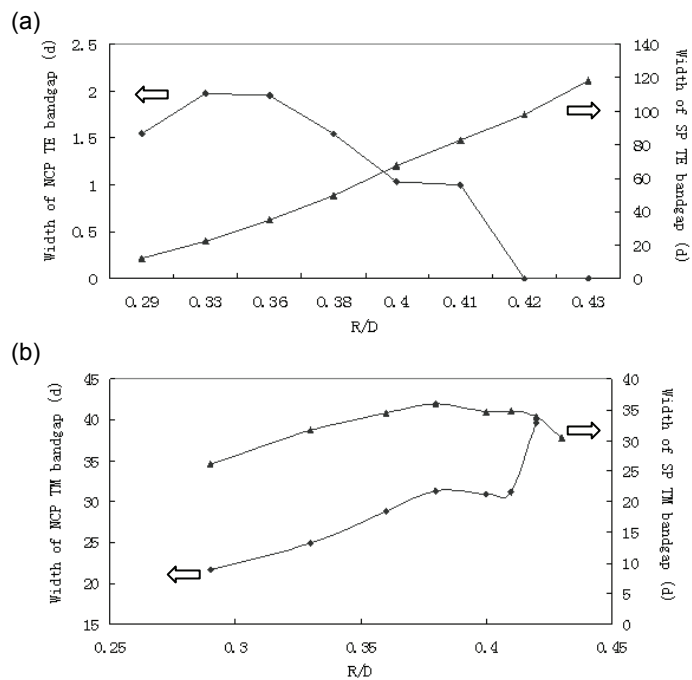


Fig2. Width of bandgap for PLZT/Al<sub>2</sub>O<sub>3</sub>. (a) TE, (b) TM.