

Large area cubic array of cubes photonic crystals

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Photonic crystals have been a topic of intense research over the last 10 years, and photonic crystal-based applications are starting to reach maturity in fields such as bio sensing and fiber optics. A thermal-IR photonic crystal can modify the emission properties of structures for temperature control. Visible/near-IR photonic crystal can be used in photonic circuits and can improve illumination efficiency. For many applications, large sheets of photonic crystal for large area coverage are important. Cubic array of cubes is the simplest structure that exhibit full bandgap behavior. For this structure, a 3-unit cell crystal requires only 4 layers rather than 14 layers for logpile structure. In addition, for a photonic crystal with a $7\mu\text{m}$ cutoff the cubes are $\sim 2.5\mu\text{m}$ on $4\mu\text{m}$ centers as compared with $\sim 1\mu\text{m}$ logpile features. This eases fabrication tolerance and allows wider choice of fabrication techniques. All these factors make this structure attractive for developing a low cost high volume fabrication process. In this paper, we will present design, fabrication and test results of the cubic array of cubes photonic crystals in the wavelength bands of $8\text{-}12\mu\text{m}$ and $0.6\text{-}2.5\mu\text{m}$.

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