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High extinction ratio hexagonal boron nitride polarizer

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Abstract

In this paper, we theoretically studied that the high extinction ratio polarizers can be designed with hexagonal boron nitride (hBN). We demonstrated that the transverse electric wave can pass the single hBN slab with high transmissivity in the range of 6.25-7.4 μm , while the transverse magnetic wave cannot pass through. The extinction ratio is always over 14 dB in that range. Besides, we also proposed a photonic crystal polarizer made of hBN and silicon, which can work in the visible band. The numerical results show that the polarizer allows the transverse magnetic wave to pass and block the transverse electric wave in the range of 0.45-0.53 μm . The minimum extinction ratio is 30 dB in this range. Therefore, we believe the low loss hBN is a promising anisotropic material for realizing polarizers and it may have applications in photography and liquid-crystal display (LCD) technology.

Keywords: hexagonal boron nitride, extinction ratio, optical polarizer, photonic crystal.

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