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# Nonlinear polarization in metal nanocomposite system based Photonic crystals

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## ABSTRACT

The properties of third-order nonlinear susceptibility in a 1D Photonic crystal (PC) consisting of nanometer sized silver particles embedded in LiNbO<sub>3</sub> (metal/dielectric composite materials) are analyzed. By applying temperature with respect to plasma frequency the dielectric permittivity is determined for silver. The temperature increase will undergo a decrease in susceptibility of the material. Due to the variation in temperature, the tuning of a photonic band gap and polariton gap are analyzed thoroughly. These nanostructures are used in ultrafast photonic switches where the optical nonlinearity of third-order susceptibility is combined with light guiding.

**Keywords:** Photonic crystals, Nanoparticle, Plasma frequency, Optical & dielectric properties, Photonic bandgap

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