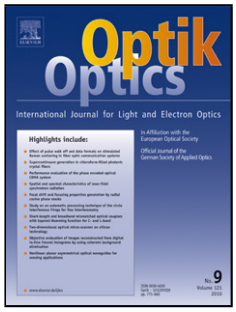

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<AT>Polarization of Enhanced Light Transmittance by Small Elongated Silver Particles Array in Glass

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<ABS-HEAD>Abstract

<ABS-P>We report an optical polarizer device with enhanced transmittance by small elongated silver particles array in glass with antireflection coatings. The device consists of periodically distributed elongated silver nanoparticles inside the transparent Ag-doped photosensitive glass. Mie theory and dipole theory are well used to explain the physics interrelationships between input light and elongated silver particles. A three dimensional model is designed to simulate and calculate the polarization properties based on FEM method. The polarization properties are mainly influenced by the parameters of the geometry structure of elongated silver particles array in the glass. With optimized design parameters of aspect ratios, filling factors, antireflection coating depths, sizes of silver nanoparticles, the transmittance is enhanced with high extinction ratio over a wide wavelength range. In our calculations, the transmittance is greater than 87% with extinction ratio more than 40 dB by use of an antireflection film over the wavelength range from 650 nm to 1100 nm. Moreover, the maximum increase of enhanced polarized transmittance is over 20% in the near infrared region with extinction ratio over 40 dB. The approach and results can be guidance for design, manufacture and application of the optical polarizer micro-nano devices.

<KWD>Keywords: polarizer device; polarizing glass; polarization property; silver particles array

<H1>1. Introduction