

Sol-Gel SiO₂-TiO₂ Multilayer Coatings for Anti-Reflective Applications

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Abstract : Multilayer structure of thin films by the sol-gel process attracts great attention for antireflection applications. In this paper, antireflective nanometric multilayer SiO₂-TiO₂ films are formed on both sides of the glass substrates by combining the sol-gel method and the dip-coating technique. SiO₂ and TiO₂ sols were prepared using tetraethylorthosilicate (TEOS) and tetrabutylorthotitanate (TBOT) as precursors and nitric acid as catalyst. Prepared coatings were investigated by Field-emission scanning electron microscope (FE-SEM), Fourier-transformed infrared spectrophotometer (FT-IR) and UV-visible spectrophotometer. After evaluation, all of SiO₂ top layer coatings showed excellent antireflection in the wavelength range of 400-800 nm where the transmittance of glass substrate is significantly lower. By increasing the number of double TiO₂-SiO₂ layers, the transmission of the coated glass increases due to applied multilayer coating properties. 6-layer sol-gel TiO₂-SiO₂ shows the highest visible transmittance about 99.25% at the band of 550-650 nm.

Keywords : thin films, optical properties, sol-gel, multilayer

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