

Physical and Optical Properties of Sol-gel Nano-silver
Doped Silica Film on Glass Substrate
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Nano-silver doped silica films were deposited on soda-lime glass slides using a sol-gel process and heat-treated at different temperatures. The films were characterized by ultraviolet-visible spectroscopy, x-ray photoelectron spectroscopy (XPS), atomic force microscopy (AFM), Rutherford backscattering spectroscopy (RBS), and transmission electron microscopy for their optical, chemical, and structural properties. The absorption peak of silver colloids (wavelength from 400 to 406 nm) was present and a blue shift and intensity reduction of the absorption peak was observed during heat-treatment. Particle size reduction and surface morphology changes in the films were observed by AFM as a function of varying heat-treatment temperatures. Silver nanoparticles were formed through spontaneous reduction of absorption intensity. An interdiffusion between the Ag in the film and Na in the substrate glass was observed by XPS and RBS. Sodium in the coating likely increased the stability of silver oxide at high temperature treated samples.