Effects of thermal annealing on the optical and electrical properties on conductor transparent films based on silver nanowire networks

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In this work, the effects of thermal annealing on the conductivity and optical properties of silver transparent and conducting nanowire films were investigated. The silver nanowires (AgNWs) synthesized by means of a polyol method using poly(N-vinylpyrrolidone) (PVP) as the capping agent present a mean diameter of ~80 nm and length of about 4 µm [1]. The prepared AgNWs solution were spin-coated on glass for optical and conductivity analysis and on silicon substrate for topological and chemical surfaces analysis resulting in a random nanowire network. The AgNWs networks were characterized by FE-SEM, UV-Vis, XPS and DSC-TGA techniques. The thermal annealing behavior was investigated by measuring in-situ the evolution of electrical resistances using the two-point probe. The experiment was carried out in a hot plate with the temperature ranging from 25 up to 400 °C under air atmosphere according D. Bellet et al [2]. Our best results exhibit an optical transparency (~85 % at 550 nm) equivalent to or better than available commercial metal-oxide thin films (indium tin oxide, ITO or Fluor tin oxide, FTO) and sheet resistance ~5 $\Omega.\square^{-1}$.

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References:

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