

Nanocomposite thin films can find application in photovoltaics, optics, fabrication of sensors, or in biomedicine.

This work investigates fabrication and characterization of thin metal-plasma polymer nanocomposite films which have direct application because of their unique optical properties (e.g. SERS – Surface-Enhanced Raman Spectroscopy) or antibacterial effects (biomedicine).

We fabricated metal nanoparticles either by magnetron sputtering (island growth) or by means of gas aggregation source of nanoparticles, thereby we got nanoparticles with very different morphologies. We used silver as a material for nanoparticles because of its antibacterial effects. We incorporated these nanoparticles into sputtered Nylon and sputtered PTFE (polytetrafluoroethylene) plasma polymer matrix. These two polymers have very different chemical structure and related different surface energy.

First, we compared growth of nanoparticles on substrates of sputtered Nylon and PTFE. Then we compared properties of sandwich nanocomposites polymer-Ag-polymer for both types of nanoparticles and for both matrix materials. We characterized produced thin films especially with respect to their stability in water (antibacterial films), thermal stability (sterilization by heating) and stability on the open air (storage). Finally, the tests were performed with objective to check possibility of use of Ag-containing nanocomposites as antibacterial coatings.