Nanocomposites and nanomaterials

Functional materials based on silver nanowires

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Nanowires are a group of widely investigated materials in terms of their potential applications such as optoelectronics, biomedicine and textronics. Among them silver nanowires (AgNWs) are very promising structures due to their unique properties. Silver as the material of the highest conductivity is perfect for manufacturing of transparent conductive electrodes or smart textiles, such as conductive and antibacterial textiles [1].

Work presents the controlled synthesis of silver nanowires colloids via the chemical reduction method and subsequent modification of AgNWs by covering the silver surface with a suitable metal oxide coating obtaining so called core-shell structures (nanosilver@oxide). The prepared materials were characterized by UV-Vis, FT-IR and Raman's spectroscopy techniques, and were visualized by transmission scanning electron microscopy (STEM). NWs were uniform in size and shape with diameter of 46 ± 2 nm and length of 8 μm, whereas the oxide shell thickness was about 15 nm, providing high stability and protection against silver degradation. Afterwards, nanowires were deposited on cotton fabrics and antibacterial tests and surface resistance measurements of the final hybrid systems were carried out.

The results show great application potential of multifunctional materials based on silver nanowires. The AgNWs modified fabrics are highly conductive, antibacterial and photocatalytically active.

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1. *Giesz P., Mackiewicz E., Nejman A., Celichowski G., Cieślak M.* Investigation on functionalization of cotton and viscose fabrics with AgNWs//Cellulose-2017.-**24.**-P. 409-422.