

ABSTRACT

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Diploma thesis title: Formulation and study of the antimicrobial agent

A literary overview of selected characteristics of silver nanoparticles is presented in the diploma thesis. Size measurement methods are described, while considerable attention is paid to photon correlation spectroscopy (PCS), which was used in the experimental part of this diploma thesis. Various methods of silver nanoparticle synthesis are outlined. Later part of the text is focused on the application of silver nanoparticles in areas concerning human health – mainly for the purposes of medicine, disinfection and as components of cosmetic products. Possible toxic effects of silver nanoparticles on human organism are also discussed.

The focus of the thesis is in the experimental part. Stability of microparticles in suspensions used for product formulation was studied, as well as the PCS instrument's capability to distinguish the size distribution of particles in aqueous medium in highly polydisperse systems and in highly diluted systems. It was proven that microparticles have a spontaneous ability to form flocks, nonionic surfactants in 0.1% concentrations increase the tendency for agglomerate formation. Microparticles are stable in temperatures up to 60°C; they are destroyed in higher temperatures. A possibility to modify the microparticle surface in alkaline medium was tested. Model mixtures of microparticles and separately prepared nanoparticles were made to gain information about the possibilities to detect individual components of very different sizes in small ratios and concentrations. A complete conversion of ionic silver to composite microparticle structures was tested and proven in some cases.