

Hybrid antibacterial nanocomposites based on silica

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Nanocomposites with biological activity is gaining a big interest in the field of nanomedicine as this capacity plays crucial role in beneficial or adverse effects of a drug or working substance on living matter [1]. Implementation of nanocomposites matrix to a drug can not only reinforce biological activity of a drug but also extend its properties [2]. For this reason, we suppose nanocomposites based on fumed silica to possess both antibacterial and healing properties against suppurative-septic processes.

The purpose of this work is to elaborate modification of commercial aerosil with specific surface area of 300 m²/g and investigate properties of nanocomposites against *S. aureus* ATCC 25923. The modification of aerosil particles was held in the water medium with addition of commercial antibacterial drug under constant stirring at room temperature. The antibacterial activity of synthesised aerosil nanocomposites were investigated with concentrations of 1, 0.1, 0.01 and 0.001%. It was introduced that even during short (60 min) contact time with *S. aureus* ATCC 25923, the number of living cells decreased up to 98.7% and during 120 min contact – up to 99%, comparing with the control group.

Based on derived results, we may conclude that synthesised hybrid nanocomposites might be offered for treatment of suppurative-septic processes that occur in wounds. Due to great biocompatibility and ability to increase thixotropic properties of substances [3], aerosil is promising matrix for further creation of bioactive hybrid composites.

1. M. Athar, A.J. Das, Adv. Mater. Rev. **1**(1) (2014) 25.
2. S. Rana, P.T. Kalaichelvan, ISRN toxicology, **2013** (2013), Article ID 574648, 11 pages
<http://dx.doi.org/10.1155/2013/574648>
3. M. Dolz, et al. Journal of Pharmaceutical Sciences. **89** (2000) 790.