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Nano-biocomposites for biomedical application

Igor Y Denisyuk¹, Natalia V Vasilyeva², Mari Iv Fokina¹, Maya V Uspenskaya¹, Julia E Burunkova¹, Natalia A Zulina², Tatiana S Bogomolova², Irina V Vybornova², Aleksandr S Stepanov² and Elena A Orishak²

¹ITMO University, Russia

²I. Metchnikov North-Western State Medical University, Russia

Silver, gold, selenium and metal oxides nanoparticles in polymer matrix intensively investigated in biomedical application due to the plenty of unique properties of antimicrobial properties to Gram-positive, Gram-negative pathogens and antifungal activity is an important scientific problem to create bio-nanocomposites. Non-selective, broad spectrum antibacterial and antifungal activity against different types of microorganisms as well as the long-term effect for a few months is one of the main requirements to biopolymers. Nanocomposites with nanoparticles Ag, Au, SiO₂, ZnO were prepared on the basis of two monomer compositions: (1) Acidic composition consisting of monomers: 2-Carboxyethyl and Bisphenol A glycerolate. (2) pH neutral formulation consisting of monomers: Diurethanedimethacrylate and Isodecyl acrylate and photo initiator. Methods of preparing polymer films based nanocomposites can be found in our papers. Exposure was increased 5 times from total time of polymerization for these composites; prepared samples were heated at 50°C for 12 hours to minimize the effects of residual monomers in the experiment. As test objects were used: Strains of fungi *Candida albicans* (*C. albicans* NCTC 885-653) and *Aspergillus fumigatus* (clinical isolate); strains of staphylococci Community-associated Methicillin-resistant *Staphylococcus aureus* (CA-MRSA, penicillin-binding protein (PBP2α) - positive); Healthcare-associated Methicillin-resistant *Staphylococcus aureus* (HA-MRSA, penicillin-binding protein (PBP2α) - positive); Methicillin-resistant *Staphylococcus epidermidis* (MRSE, penicillin-binding protein (PBP2α) - positive); Methicillin-resistant *Staphylococcus epidermidis* (MRSE, penicillin-binding protein (PBP2α) - negative); Methicillin-resistant *Staphylococcus aureus* (MRSA, penicillin-binding protein (PBP2α) -negative); Methicillin-susceptible *Staphylococcus aureus* (MSSA); Methicillin-susceptible *Staphylococcus epidermidis* (MSSE). The antifungal activity of ZnO nanocomposites based on polymeric matrix 2-Carboxyethyl acrylate/Bisphenol-A-glycerolate (1 glycerol/phenol) diacrylate against *C. albicans* and *A. fumigatus* was found. Pronounced suppressive effect of ZnO nanocomposites based on polymeric matrix 2-Carboxyethyl acrylate/Bisphenol-A-glycerolate (1 glycerol/phenol) diacrylate against staphylococci was identified. The antifungal activity of polymeric matrix based on 2-Carboxyethyl acrylate/Bisphenol-A-glycerolate (1 glycerol/phenol) diacrylate against *C. albicans* was found.

Biography

Igor Y Denisyuk has his expertise in field of nanoparticles, non-linear molecular crystals, polymer material, photonics, phodegradable nanocomposites and biomedical nanocomposites.

denisiuk@mail.ifmo.ru

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