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Light-activated antibacterial nanofibers

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The creation of an antibacterial material with triggerable properties enables us to prevent the emergence of resistant bacterial strains. As a potential light-activated antibacterial material, polymethylmethacrylate (PMMA) nanofibers doped with silver nanoparticles (AgNPs) and meso-tetraphenylporphyrin (TPP) were prepared by electrospinning. Upon light irradiation at the wavelength corresponding to the TPP absorption peak two processes take place: the creation of reactive oxygen species and the enhanced elimination of AgNPs from polymer matrix. Furthermore, under prolonged light irradiation the AgNPs/TPP/PMMA nanofibers displayed enhanced longevity and photothermal stability. Depending on the light source and its power the light irradiation leads to the migration of the AgNPs to the surface and their release from nanofibers or to growth of AgNPs aggregates on the nanofibers boundaries. Antibacterial tests on *Staphylococcus epidermidis* and *Enterococcus faecalis* showed the excellent light-triggerable antibacterial activity of the doped materials. The observed effect of light-induced AgNPs release and the increased TPP stability, open the way for design of new generation of antibacterial materials with combined antibacterial activity.

Biography

Elashnikov Roman is currently a PhD student at the University of Chemistry and Technology, Prague, Czech Republic, from 2014 – present. He did his Master's degree in Nanomaterials, from University of Chemistry and Technology, Prague, Czech Republic in the year 2012-2014. He did his Master's degree in Polymer Science and Engineering, from Belarusian State Technological University, Minsk, Republic of Belarus, in the year 2010 – 2011. He did his Bachelor degree in Polymer Science and Engineering, from Belarusian State Technological University, Minsk, Republic of Belarus in the year 2005 – 2010. He has published 5 papers in reputed journals.

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