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Department of Biomedical Engineering

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Photocatalytic, plasmonic, and upcoversion nanoparticles for biomedical imaging and therapy

Objectives:

Design of photocatalytic antibacterial indoor coatings
Design of skin UV-protecting agents
Transcutaneous administration of nanoparticles for direct delivery to the region of interest, i.e. pathologically modified areas of the tissue
Design of agents for optical diagnostics and therapy at cell and tissue levels
Optical characterization of exosomes

Outline:

Introduction
Gypsum-titania fiber nanocomposites for indoor antimicrobial coatings
Titania nanoparticles for skin protection against UV light
Nanoparticle delivery
Design of gold nanoagents for optical imaging and therapy
Heating of gold nanoparticles
Upconversion nanoluminophores for deep-tissue imaging
Cell-derived vesicles: optical characterization
Conclusion

Bio: Valery V. Tuchin received M.S. in Radio-Physics and Electronics (1966), Ph.D. in Optics (1974), and Dr.Sc. in Laser Physics (1982) from the Saratov State University, Saratov, Russia. Currently he is Professor and holds the Optics and Biophotonics Chair. He is also a Director of Research-Educational Institute of Optics and Biophotonics at Saratov State University and Head of Laboratory on Laser Diagnostics of Technical and Living Systems, Institute of Precision Mechanics and Control, Russian Academy of Sciences. His research interests include biophotonics, tissue optics and laser medicine, tissue optical clearing, physics of optical and laser measurements, biosensing, photonic crystal fibers, nanobiophotonics, and theranostics. He has authored more than 400 peerreviewed papers and books.
Prof. Tuchin is a member SPIE, OSA, and IEEE. He has been awarded Honored Science Worker of the Russian Federation and SPIE Fellow; he is a Vice-President of Russian Photobiology Society. In 2007 he was awarded the SPIE Educator Award. He is a FiDiPro Professor of University of Oulu (Finland).
Prof. Tuchin is an organizer and co-organizer of several annual and biannual international conferences and summer schools, including subconferences of SPIE BiOS (USA) and SPIE Photoni