

Design and antimicrobial profiling of silver- and copper-chitosan nanocomposites for biomedical applications

Summary

The PhD project aims to design novel silver- and copper-chitosan nanocomposites for biomedical applications, such as wound-dressings and implants, and identify the nanocomposites physicochemical properties yielding the highest antimicrobial efficiency with no adverse side effects to humans.

Research field:	Chemistry and Biotechnology
Supervisors:	Mariliis Sihtmäe Dr. Kaja Kasemets
Availability:	This position is available.
Offered by:	National Institute Of Chemical Physics And Biophysics
Application deadline:	Applications are accepted between September 01, 2021 00:00 and September 30, 2021 23:59 (Europe/Zurich)

Description

This PhD project aims to create and analyze silver- and copper-chitosan nanocomposites with synergistic properties of antimicrobial and immune-stimulating action. Thus, the main objective of the project is to synthesize nanocomposites and identify their physicochemical properties yielding the highest antimicrobial and immune-modulating efficiency with no adverse side effects to humans.

Main tasks within the PhD project:

- Synthesis of silver- and copper-chitosan nanocomposites (NC)
- Physicochemical characterization of NC by UV-Vis, XRD, EDX, TEM, DLS, FTIR, and solubility by AAS
- Evaluation of NC antimicrobial potency and mode of action to the clinically relevant bacteria and fungi (including antibiotic-resistant ones)
- Evaluation of NC cytotoxicity and biocompatibility to the mammalian cells in vitro
- Evaluation of immune-modulating effects of NCs in vitro (release of cytokines, phagocytosis activity in macrophages)
- Evaluation of the NC bio-interactions by the laser scanning confocal microscopy
- Conducting data analysis
- Manuscript writing

Supervisors:

Dr. Kaja Kasemets (kaja.kasemets@kbfi.ee) and Mariliis Sihtmäe (mariliis.sihtmae@kbfi.ee), Laboratory of Environmental Toxicology, National Institute of Chemical Physics and Biophysics

Applicants should fulfil the following requirements:

- Master's degree in biology, chemistry, pharmacology, or a related discipline
- Experience in nanoparticles synthesis and characterization
- Experience in microbiology, and in vitro cell culture methods are a bonus
- Strong team-working skills, capable of independent work and taking initiative
- Good command of English (spoken and written)
- Data analysis/statistics skills

The applicant should submit a letter of motivation in English (one A4 page) and be prepared for a Skype interview



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