

Topics for Analytical Biochemistry 2019/2020 admission

1) Polyelectrolytic Complexes Between Algal Galactans and Chitosan: Rheology and Biological Activities

Supervisor: *PhD* Rando Tuvikene, rando.tuvikene@tlu.ee

The PhD project focuses on development of novel polysaccharide-based biomaterials with beneficial rheological and biological properties (e.g. can be used in wound healing formulations).

The main tasks of the project are as follows.

- Preparation and purification of chitosan and algal galactan (various carrageenans and agarans) samples.
- Modification of the polysaccharide samples by chemical, enzymatic or ultrasonic treatment and characterization of the preparations by structural analysis and chromatographic methods.
- Optimization of the conditions for the preparation of polyelectrolyte complexes on the basis of previously obtained pure polymeric samples.
- Characterization of the rheological and optical properties of the obtained biomaterials.
- Screening the samples for antioxidant, anticoagulant, anti-inflammatory, antimicrobial activities.

The main analytical/instrumental methods used in the project are: multidetector HPLC, HPLC-MS, preparative chromatography, GC-MS/FID, NMR, FTIR, FT-Raman, spectrophotometry, fluorimetry, dynamic rheometry, ultrafiltration techniques, coagulometry.

More information about Analytical Biochemistry PhD programme: tlu.ee/en/analytical-biochemistry

2) Enzymatic Conversion of Marine Polysaccharides: Properties of the Products and Potential Applications

Supervisor: *PhD* Rando Tuvikene, rando.tuvikene@tlu.ee

The PhD project focuses on conversion of various marine polysaccharides (agars, carrageenans, alginates, chitosan) by enzymatic bioprocesses to obtain novel products with beneficial properties (e.g. versatile biological activities).

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The main tasks of the project are as follows.

- Preparation and purification of the marine polysaccharides to be utilized as substrates in enzymatic reactions.
- Screening for the microorganisms of marine and terrestrial origins suitable for production of the enzymes for biomass conversion.
- Optimization of the enzymatic bioprocess conditions for increased yield and selectivity.
- Screening the samples for antioxidant, anticoagulant, anti-inflammatory, antimicrobial activities.
- Characterization of the degradation products (partially degraded polysaccharides and oligosaccharides) obtained by enzymolysis of various substrates.

The main methods used in the project are: common microbiological methods, cell culture techniques, PCR technique, DNA isolation and purification, protein purification methods, HPLC, preparative chromatography, GC-MS/FID, NMR, FTIR, spectrophotometry, fluorimetry, coagulometry.

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