

Thesis topics

Department of Inorganic and Analytical Chemistry

2025/2026. academic year II. semester

Supervisors: Prof. Dr. Péter Buglyó and Ildikó Nóra Kovács

1. UV-VIS study of the interaction between $[(\eta^6\text{-}p\text{-cym})\text{Ru}]^{2+}$ and 2-ImXHpH ligands

there is already a candidate for the topic

2. Investigation of the Fe(III) binding ability of 2-ImXHpH type ligands

there is already a candidate for the topic

3. Investigation of the interaction of QuinEtHpH with organorhodium and –ruthenium ions

there is already a candidate for the topic

4. Organorhodium and –ruthenium ion binding strength of 4-ImButHpH

there is already a candidate for the topic

Supervisor: Dr. Attila Forgács

1. Preparation and Characterization of Mixed Carbohydrate-Based Biopolymer Aerogels

chemistry BSc – 1 Student, there is already a candidate for the topic

Mixed carbohydrate-based biopolymer aerogels are lightweight and porous materials that are produced from natural polymers. In our research, we prepare aerogels by combining alginate and pectin. These aerogels offer environmentally friendly and sustainable alternatives to traditional synthetic materials. During the preparation, we plan to stabilize the gel structure by supercritical drying, thus preserving its high porosity and low density. During the characterization, the structure, pore size distribution, and mechanical properties are examined. These materials offer a wide range of applications in the fields of medicine, food industry, and packaging materials.

2. Preparation and Characterization of Biopolymer Aerogels Chemical

chemical engineering BSc – there is already a candidate for the topic

Biopolymer aerogels are lightweight, highly porous materials derived from natural polymers. In this work we would like to prepare aerogels from soy and gelatin. They combine the environmental benefits of biodegradability and renewability with remarkable physical properties like low density and high surface area. Due to their tunable pore structure, they exhibit excellent thermal insulation, adsorption, and mechanical strength. These aerogels also offer outstanding biocompatibility, making them ideal for biomedical applications such as drug delivery or tissue engineering.

Supervisor: Prof. Dr. Attila Gáspár

Analysis of cyanobacterial toxins using CE-MS

chemistry BSc

Supervisors: Prof. Dr. Attila Gáspár and Dr. András Melinda

Analysis of glycosylated forms of hemoglobin using CE-MS

chemistry MSc

Supervisor: Dr. Norbert Lihi

Synthesis and investigation of transition metal complexes with antioxidant properties

chemistry BSc/MSc, chemical engineering BSc/MSc

In this project, novel copper-, manganese-, or iron-containing complexes with open-chain or macrocyclic ligands will be synthesized. Their stability and structure in aqueous solution will be characterized, and their SOD (superoxide dismutase) activity will be examined.

Supervisor: Prof. Dr. Katalin Várnagy

Study of transition metal ion-peptide interactions

there is already a candidate for the topic

The interactions of proteins involved in biological processes with essential metal ions are vital. However, if the concentration of these essential metal ions significantly changes, or if toxic metal ions enter the body, these metal ion-protein interactions can lead to development of different diseases (e.g. neurodegenerative diseases). Thus, understanding the interactions between different protein fragments and transition metal ions can contribute to understanding the chemical background of diseases related to these proteins.