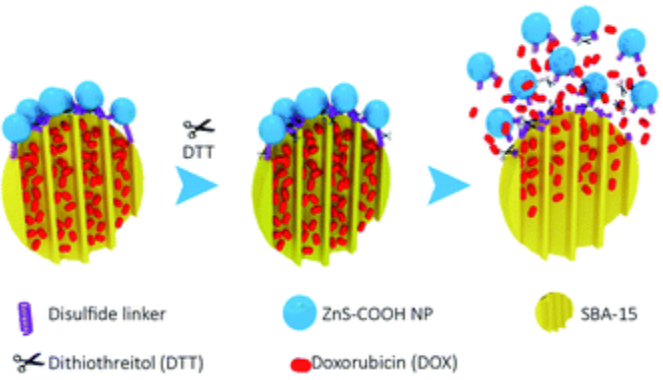
INORGANIC CHEMISTRY

Nanoporous silica particles for targeted drug delivery.

supervisor: prof. RNDr. Vladimír Zeleňák, DrSc. (vladimir.zelenak@upjs.sk)

study form: full time

Annotation: The thesis is a follow-up to several years of research focused on the development of new intelligent drug delivery systems releasing bioactive substances in a targeted way by the influence of physical or chemical stimulus [1-3]. The theme of the PhD thesis is based on this knowledge and concept and its motivation is to design, prepare and test inorganic porous carriers based on silica matrix, transporting the drug to cancer cells by active targeting. For this purpose, the silica nanoparticles will be modified with ligands that due to the specific ligand-receptor interactions on the surface of the cancer cell, allow preferential binding and internalization of such systems by cancer cells.



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Porous coordination polymers as heterogeneous catalysts of condensation reactions.

supervisor: doc. RNDr. Miroslav Almáši, PhD. (miroslav.almasi@upjs.sk)

study form: full time

Annotation: The dissertation thesis builds on many years of research in the field of development and application of porous coordination polymers (MOF). The aim of the dissertation is the preparation and postsynthetic modification of MOF materials as catalysts for condensation reactions. In the first step, the design and synthesis of heterogeneous catalysts will be proposed, the surface of which will be postsynthetically modified with various functional groups (amines, thiols, Schiff bases), which will increase the catalytic activity of the material.

Subsequently, the course of selected condensation reactions will be studied by monitoring the respective conversions and selectivities.

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Cytotoxic complexes with 3-acetyl-4-hydroxy coumarine derivatives.

supervisor: doc. RNDr. Ivan Potočňák, PhD. (ivan.potocnak@upjs.sk)

study form: full time

Annotation: The thesis is a continuation of our long-time research focused on the preparation of cytotoxic complexes. The aim of the thesis is a preparation of halogen derivatives of 3-acetyl-4-hydroxy coumarine, followed by condensation reactions with suitable amines to prepare Schiff bases, and to use them as ligands in the preparation of biologically active complexes. The prepared ligands and complexes will be characterized by the necessary physicochemical methods (IR, UV-VIS, NMR, elemental analysis, thermal analysis, X-ray structural analysis) and the antiproliferative activity of the prepared substances will be studied in cooperation with cooperating institutions. This will be assessed against selected tumor cell lines. On the basis of the knowledge on the composition, structure and biological properties of the prepared compounds new compounds will be prepared and characterized in order to modify their structure and therefore their antiproliferative activity.

Coordination compounds with potential for therapeutic applications.

supervisor: doc. RNDr. Zuzana Vargová, Ph.D. (zuzana.vargova@upjs.sk)

study form: full time

Annotation: The thesis is focused on observation the conditions of coordination compounds preparation predominantly based on transition metal ions with N- and/or O-donor ligands and to theirself preparation in order to obtain substances with expected antimicrobial activity. Solution studies will be performed by potentiometric and spectroscopic (NMR, UV-Vis, fluorescence) methods and isolated synthetic products will be characterized by available techniques (IR, UV-VIS, NMR, CHN, thermal analysis, X-ray structural analysis). Further biological evaluations will be performed against selected pathological strains of microorganisms and cancer cell lines, and the acquired knowledge about the structure, other physicochemical

and biological properties will allow their correlation and subsequent modifications to increase efficiency and selectivity.