

INORGANIC CHEMISTRY

Complexes with anti-cancer activity based on planar ligands.

supervisor: doc. RNDr. Ivan Potočňák, PhD.

study form: full time

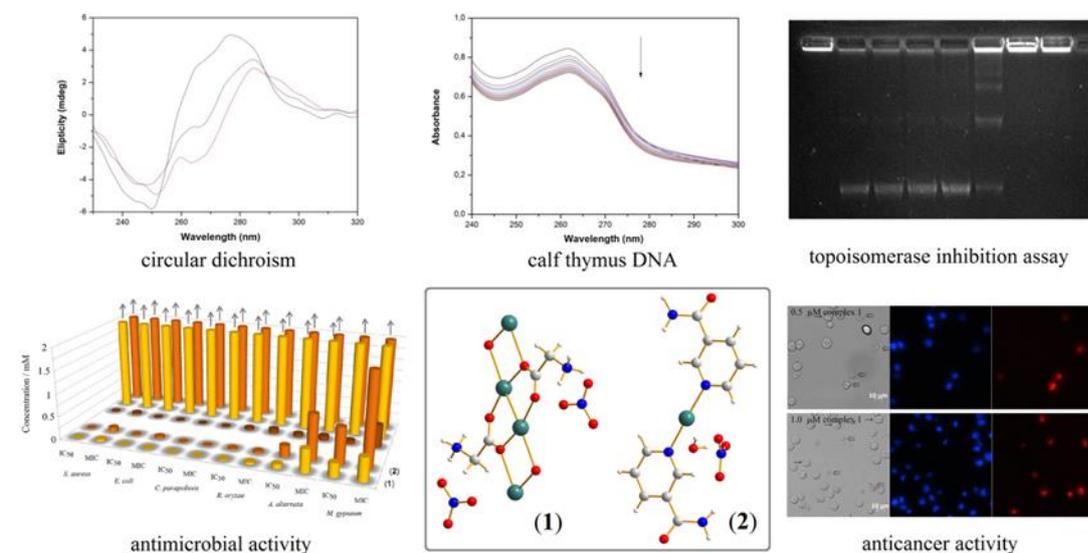
Annotation: The aim of the thesis is to prepare and characterize (IR, UV-VIS, NMR, elemental analysis, thermal analysis, X-ray structure analysis) complexes of selected transition metals with both commercially available and synthesized planar N- and O-donor ligands, which are able to intercalate to the DNA and thus enable to exhibit anti-tumor activity of the prepared complexes. This will be assessed by MTT assays against selected tumor cell lines. On the basis of the knowledge on the composition, structure and biological properties of the prepared compounds to prepare and characterize new compounds in order to modify their structure and therefore their anti-tumor activity.

Silver and zinc complexes with potential biological activity.

supervisor: doc. RNDr. Zuzana Vargová, Ph.D.

study form: full time

Annotation: Increasing antimicrobial drug resistance encourages chemists, namely in the field of bioinorganic chemistry to search for new forms of treatment against pathogenic microorganisms. The underlying idea is to connect antimicrobial metal (Zn(II), Cu(II), Ag(I)) and efficient organic ligand into a new synergic drug. The fundamental idea of PhD study will be preparation and characterization of new silver (I) and zinc(II) coordination compounds and selected samples will be tested by relevant antimicrobial and anticancer techniques (Figure).



Obrázok: Rendošová, M., Vargová, Z.*, Kuchár, J., Sabolová, D., Levoča, Š., Kudláčová, J., Paulíková, H., Hudecová, D., Helebrandtová, V., Almáši, M., Vilková, M., Dušek, M., Bobál'ová, D., New silver complexes with bioactive glycine and nicotinamide molecules – Characterization, DNA binding, antimicrobial and anticancer evaluation, *Journal of Inorganic Biochemistry*, 168 (2017) 1-12.

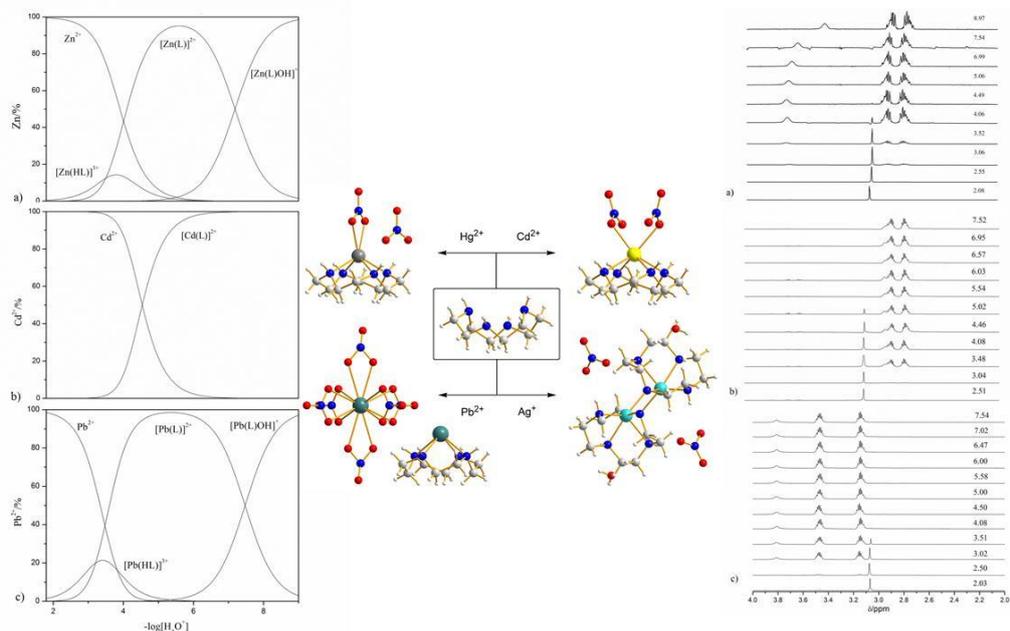
Potential toxic metal ions chelating agents based on N, O, S - donor ligands.

supervisor: doc. RNDr. Zuzana Vargová, Ph.D.

study form: full time

Annotation: The heavy metals presence in many ecosystems as a consequence of mutual natural and anthropogenic activities leads to the inevitable need to remove these metals from the environment. Consequently, some research fields such as chemistry (in collaboration with ecology or biology) suggest possible solutions. One of the most promising solutions is the

preparation of new biodegradable chelating agents based on N, O, S - donor ligands to eliminate the amount of toxic metal ions from the environment. The underlying idea will be the study of the complexing properties of the ligands as potential new chelating agents in the solution as well as the isolation of the new metal ionic coordinating compounds (Cd^{2+} , Hg^{2+} ,



Pb^{2+} , Ag^{+}
etc.) and their characterization (Figure)

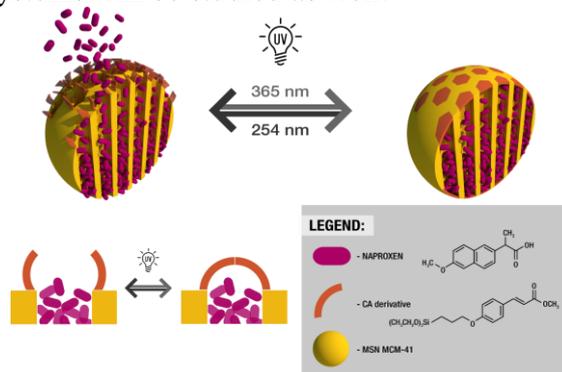
Obrázok: Litecká M., Gyepes R., Vargová Z.*, Vilková M., Almáši M., Walko M., Imrich J. Toxic metal complexes of macrocyclic cyclen molecule - synthesis, structure and complexing properties, *Journal of Coordination Chemistry*, 70 (2017) 1698-1712

Nanoporous materials as drug delivery systems with targeted action.

supervisor: doc. RNDr. Vladimír Zeleňák, PhD.

study form: full time

Annotation: The thesis will focus on the synthesis of nanoporous matrices that can be used for targeted drug delivery and release. Bioinert nanoporous matrices, based on nanoporous silica will be specifically modified so that, depending on the external stimuli (pH, electromagnetic radiation...) the systems will show targeted and controlled drug release on the site of the action, e.g. in the cancer cell. The nanoporous matrices with various dimensionality of porous system and various pore sizes will be used. During the work, the anticancer drugs 5-fluorouracil, pemetrexed and other will be tested as model drugs. The cytotoxicity of the prepared drug delivery systems will be studied as well.



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