

ABSTRACT

Charles University, Faculty of Pharmacy in Hradec Kralove

Department:	Department of Biophysics and Physical Chemistry
Candidate:	Patricia Šeminská
Supervisor:	doc. PharmDr. Veronika Nováková, Ph.D.
Consultant:	PharmDr. Lukáš Lochman, Ph.D.
Title of thesis:	Synthesis and Study of New Unsymmetrical Azaphthalocyanines bearing azathiocrown ether for cation binding

Azaphthalocyanines (AzaPc) are planar macrocyclic compounds, which are aza-analogues of synthetic phthalocyanine dyes. AzaPc, due to their system of conjugated double bonds, show interesting photophysical properties such as fluorescence emission and absorption in the red area of the spectrum, which is suitable for biological applications. These properties depend on character of peripheral substituents and central metal cation. The attachment of alkylamine group enables intramolecular charge transfer (ICT), that causes efficient quenching of fluorescence (non-fluorescent OFF state of the sensor), and leads to decrease of fluorescence quantum yield to zero. Blocking of ICT is used in development of new fluorescent sensors for metal cations, in which metal cation is coordinated into recognition moiety (e.g. azacrown ether) of the sensor. It results in a significant increase of fluorescence (fluorescent ON state of the sensor).

Preparation of new AzaPc sensor started *via* a multi-step procedure resulting in a new azathiocrown (*i.e.* Boc-1,4,7,10-tetrathia-13-azacyclopentadecane), which was deprotected and used in a nucleophilic substitution with 5,6-dichloro-2,3-dicarbonitrile. Desired monosubstituted intermediate, suitable for subsequent attachment of butoxy group, was not prepared in sufficient purity to be used further to obtain key precursor 5-butoxy-6-(monoazatetrathia-15-crown-5)-2,3-dicarbonitrile. Another precursor, 5,6-bis(*tert*-butylsulfanyl)pyrazine-2,3-dicarbonitrile was successfully synthesized according to procedure published in literature. The results of this Diploma Thesis will be useful

for a follow-up optimization of reaction steps to get target AzaPc, its sensitivity toward heavy metal cations will be investigated (Pb^{2+} , Cd^{2+} , Hg^{2+}).