Abstract

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Title of diploma thesis: Synthesis and investigation of aminophthalocyanines II.

Azaphthalocyanines (AzaPc) are nitrogen analogues of phthalocyanines (Pc) where benzene rings are replaced for pyrazine, pyridine or pyridazine respectively. AzaPc are characterized by broad spectrum of characteristic photophysical and photochemical properties that are responsible for their use in many areas, e.g. as industrial dyes, as photosensitizers in photodynamic therapy or as fluorescent sensors.

In recent years, importance of dialkylamino substituted AzaPc has been rising in area of fluorescence quenching. Their broad absorption spectrum makes them suitable candidates to become universal quenchers. Process responsible for their quenching ability is called intramolecular charge transfer (ICT) from peripheral dialkylamino groups. These groups are also responsible for formation of unique supramolecular arrangement - J-dimers. The influence of bulky dialkylamino substituents on formation of J-dimers, which occurrence is rarer than the other possible form – H-dimers, is studied in this work. Results also describe how ICT is affected by self-assembly into J-dimers.

Synthesis of studied AzaPc began with preparation of their precursors from suitable starting molecules. Precursors were prepared by nucleophilic substitution of 5,6-dichloropyrazine-2,3-dicarbonitrile with desired amines. These precursors undergo cyclotetramerization with use of lithium butanolate. Metal-free AzaPc bearing peripheral dialkylamino substituents were obtained in this process. Subsequently, these AzaPc were chelated by zinc (II) cations, which resulted in their respective zinc (II) derivatives. The absorption and fluorescence spectra of synthesized AzaPc were measured in solvents of different polarity. Production of singlet oxygen was also measured in the same solvents.