ABSTRACT

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Title of Thesis Study of J-dimer formation at azaphthalocyanine attached to an oligodeoxynucleotide chain

Phthalocyanines and azaphthalocyanines are planar, macrocyclic synthetic molecules with an extensive system of conjugated double bonds, which give the molecule its characteristic color.

They have wide applications in industry as dyes, catalysts, and in compact discs (CDs). Phthalocyanines and azaphthalocyanines are also utilized in medical fields, where they can serve as fluorescent sensors, fluorescence quenchers, or be used as photosensitizers in photodynamic therapy aimed at tumors or the eradication of resistant bacteria. Azaphthalocyanines are capable of forming supramolecular structures known as J-dimers, which possess unique photophysical properties.

The aim of this thesis was to study J-dimers of azaphthalocyanines after their attachment to a oligodeoxynucleotide strand. Therefore, it was first necessary to synthesize an unsymmetrical azaphthalocyanine and subsequently attach it to a oligodeoxynucleotide strand using solid-phase „click“ chemistry.

After the synthetic part, we focused on studying the properties of the synthesized macrocycle. We investigated its ability to form J-dimers in various solvents and also determined photophysical properties such as fluorescence capability and singlet oxygen production.

This work will serve as a model for further exploration of the properties of azaphthalocyanines bound to oligodeoxynucleotide chains.