



SUMMARY OF DOCTORAL DISSERTATION

„Synthesis and properties of new functionalized polymeric micelles
for therapeutic applications”

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The most challenging aspect of modern chemical technology in the field of dispersed systems is preparation of therapeutic and diagnostic substances carriers. The main aim of the mentioned strategy is to improve their targeted delivery, stability under physiological conditions as well as reduce side effects. To overcome the poor photosensitizers' key substances used in photodynamic therapy, a minimally invasive anticancer treatment application properties, e. g. solubility in aqueous systems and photoactivity, many types of nanocarriers, providing appropriate microenvironments, have been developed. The mentioned benefits may be additionally enhanced by chemical modification of nanocarriers, so called functionalization, via coupling with moieties as poly(ethylene oxide) chain and ligands or conjugation with hydrophilized photosensitizer.

The main dissertation purpose was to design and synthesize new functionalized amphiphilic block copolymers as well as to develop technology of fabrication polymeric micelles possessing intended features - nanocarriers for bioactive substances, mostly zinc phthalocyanine-type photosensitizers, delivery. Their characterization and imaging comprised size and morphology determination by means of dynamic light scattering and atomic force microscopy, respectively. The additional investigations by various spectroscopic methods enabled to gain information about solubilization parameters, cargo locus and its photoactivity. The obtained and characterized polymeric micelles delivery systems for zinc phthalocyanine type photosensitizers exhibited good physical and photochemical stability, high drug loading, enhanced ability to generate reactive oxygen species and size of less than ca. 150 nm with low polydispersity indices – the parameters that meet the requirements for nanocarriers in PDT.

The performed studies enabled to gain crucial parameters impacting on polymeric micelles' stability and application properties. The potential of the obtained nanocarriers was proved in biological studies on normal and cancer cell lines, including intracellular distribution and cytotoxicity.