SUMMARY OF DOCTORAL THESIS

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The purpose of this study was to design and synthesize aromatic imides as potential active fragments of new drugs and materials for organic electronics. The first group of tested compounds was formed by conjugating naphthalic or phthalic fragment with thiosemicarbazone containing unsaturated six-membered rings of piperidine, piperazine and morpholine. The second group was iminaphthalimides obtained by introducing aliphatic or aromatic substituents into the imide part and forming an imine bond located in position 3 of the 1,8-naphthalimide core by the condensation of amines with salicylaldehydes.

As a part of this study, 51 compounds were obtained and tested. Following subgroups of these compounds can be indicated: naphthaltiosemiimides (NITs), naphthaltiosemidiimides (NDITs), pyromellitithiosemidiimides (PMITs), 3-nitronaphthalimides (3-NNI), 3-aminonaphthalimides and iminonaphthalimides (ImNI). Chemical structure of the obtained compounds was determined using the ^{1}H and ^{13}C NMR method, while purity was determined by elemental analysis. The physico-chemical and biological tests were performed for the compounds obtained to allow the structure-activity (property) study. Thiosemicarbazones (NITs, NDITs, PMITs) were tested for their complexing capability vs. various metal ions as well as biological activity against the HCT 116p53+/+; HCT 116p53 -/- colorectal and MCF-7 breast cancer cell lines. The study showed a reduction in the ability to complex Cu^{2+} and Fe^{3+} by NITs compared to biologically active TSc analogues. This could be explained by the steric hindrance in the imide part. In addition, no cytotoxic properties of these compounds have been demonstrated for the tumor lines tested. However, for imine derivatives (ImNI) the basis characteristics were performed in relation to the measured properties: thermal (TGA, DSC), electrochemical (CV), optical (UV-Vis and PL) in solution and solid (layers or blends). This specifies a potential for the application of these compounds in organic electronics. Electroluminescence (EL) was tested in OLED diodes, where the compound played a role of a layer or a component with PVK:PBD. The best electroluminescent properties both alone and in a form of a component from PVK: PBD was shown by compound ImNI 3a in a weight content of 2%. In addition, due to the lack of cytotoxicity of ImNI to HCT 116, these compounds were also tested for their potential use as fluorescent dyes in bioimaging. These studies showed that both 3-ANI 1 and ImNI: 1a, 1b can be successfully used for imaging live cells. In turn, studies on sublocation of ImNI 1b showed that the compound stains the mitochondria and endoplasmic reticulum. The conducted research allowed us to determine the usefulness of the novel compounds in pharmacy and organic electronics.