„The synthesis and photophysical properties of some azaheterocyclic systems as potential materials for optoelectronics"

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The technological progress observed in recent years in organic electronics has induced a great interest in the search of new substances with potential application as materials for fabrication of organic light emitting diodes, photovoltaic cells or printed electronics. Therefore, there is a constant demand for new compounds, either in the form of simple molecules, oligomers or polymers with appropriate properties. Moreover, new synthetic procedures to fulfill these requirements are still under development. Significant part of these materials are nitrogen heterocycles, including derivatives of pyridine, pyrazole, quinoline or quinoxaline system.

The thesis is devoted to the synthesis of 1*H*-pyrazolo[3,4-*b*]quinoxalines and their photophysical properties. In this work it has been hypothesized that the procedure consisting of the reductive cyclization of the appropriate 5-(*o*-nitrophenyl)-1,3-disubstituted pyrazoles is a good and regiospecific method of preparation above mentioned quinoxaline derivatives.

The aim of the study was to develop a new route for the synthesis of 1*H*-pyrazolo[3,4-*b*]quinoxaline and to confirm its regiospecificity. Additionally to reduce its time by modifying the reaction conditions using a microwave reactor. Then, the developed method was compared with other synthesis pathways. The structures of the obtained compounds were confirmed by means of spectroscopic techniques (^{1}H NMR, ^{13}C NMR, IR) and elemental analysis. For all 1*H*-pyrazolo[3,4-*b*]quinoxaline derivatives, photophysical properties were examined, characterizing their absorption and fluorescence spectra, and quantum fluorescence life and yields. The influence of the type and location of the substituent in the carbocyclic ring on the photophysical properties of the basic system was assessed.

Taking into consideration the presented results, it seems that the method of 1*H*-pyrazolo[3,4-*b*]quinoxaline synthesis presented in the manuscript, is the most universal procedure developed up till now and is limited only to the availability of starting materials. The obtained new pyrazoloquinoxaline derivatives have potential as new materials for applications in optoelectronics (eg for the construction of organic light emitting diodes OLEDs).