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Doctoral Thesis Abstract

Electrochemical and spectroelectrochemical studies of electronic interactions in donor-acceptor-donor (DAD) and donor-acceptor (DA) systems

The development of technology has significantly accelerated with the advent of new materials, including for use in LED displays. The advantage of using organic compounds is the practically unlimited possibility of modifying their chemical structure, and thus the selection of appropriate properties for a specific application.

The main aim of the work was to determine the effects of different donor and acceptor groups on compound physical-chemical properties. As acceptor groups were used 1,8-naphtalimide, tetrazine, and 5,6,7,8,9,10-hexahydrocycloocta[*d*]pyridazine with well-known donor groups such as carbazole, phenoxazine, phenothiazine, and dimethylacrdine.

Characterization of the compounds was performed by electrochemical and spectroelectrochemical methods. Electrochemical methods allowed to determine the oxidation and reduction potentials, as well as to characterize the dependence of the potential on the structure of the molecule. These potentials are important to estimate energy levels, which are necessary for the preparation of devices. Also, was assessing the impact of the number of electroactive substituent on the electropolymerization process and electrochemical stability. Using UV-VIS and ESR spectroscopy methods have characterized the changes that occur in the molecule and intermolecular interaction during redox processes. For comparison was used quantum theoretical calculations. Using these methods were described conductive oligomer formed during the oxidation process.

The results should broaden the knowledge of the influence of the structure of a chemical compound on its electrochemical properties. Due to the obtained results, described in the paper, it was found that some of the tested compounds could be used in OLEDs.