Summary of doctoral thesis

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" Cycloaddition reactions of alkynes to β-keto esters- new possibilities in the synthesis of conductive polymer precursors"

Dissertation takes the issue to synthesis of conductive polymer precursors which are thiophene derivatives and their properties – primarily electrochemistry and spectroelectrochemistry. Comprehensive electrochemical and spectroelectrochemical studies, as well as knowledge gained in DFT calculations allow for a detailed discussion of the construction of the resulting compounds and their properties.

The first stage of doctoral thesis was to develop methods of obtaining, separation, and verification the structure of compounds (precursors) to belong to group (tetra-, penta- or hexasubstituted) benzene derivatives and (tri- or tetrasubstituted) 2-pyranone derivatives. Scheduled molecules were synthesized by ([2+2+2] or [2+1+2+1]) cycloaddition reactions of alkynes to β-keto esters and [4+2] Diels-Alder cycloaddition. The preparation of the final products was preceded by the synthesis of the necessary substrates, exactly alkynes (obtained by Sonogashira coupling) as well as β-keto esters. Construction of the synthesized compounds was verified by ^{1}H, ^{13}C NMR spectroscopy and HRMS. For compounds obtained as solids, the melting points were measured.

In the second stage of doctoral thesis, the synthesized compounds were investigation to electrochemical methods by cyclic voltammetry (CV) and differential pulse voltammetry (DPV). For all the precursors (monomers), polymerization tests were carried out to obtain the polymers. The polymers were subjected to spectroelectrochemistry studies. The above mentioned studies have allowed us to determine in what conditions can be used from the designed precursors (monomers) to obtain conductive polymers and to determine the basic properties of the materials, which determine their practical applications.