Streszczenie w języku angielskim pracy doktorskiej pod tytułem: Funkcjonalizowane benzoksazyny jako prekursory nowych materiałów.

The search for new polymeric materials with new properties and functions is a constant leading trend both in basic research and in scientific industrial research. The polymer industry is one of the sectors that intensively introduces innovations resulting from basic research. In recent years, the environmental aspects related to environmental degradation of polymeric waste have been particularly important, introducing a new research trend focused on functional polymer materials and recycling. Therefore, alternative materials to those which are problematic in the context of environmental protection of petropolymers are being intensively sought, in this context there is a group of polymeric materials having similar properties to petropolymers because not all of them can be replaced by degradable materials.

In this trend, polybenzoxazines can be classified as alternative materials to the so-called phenolic resins. These compounds can be extensively modified and their functionalization can take place at the stage of synthesis of 1,3-benzoxazine monomers. The main aim of the study was to find new functional 1,3-benzoxazines, which increase the application potential of these monomers, affecting the unconventional use of polybenzoxazines derived from them. An important problem is also the design profile of these compounds with the assessment of their toxicity and environmental impact.

This work is focused on the synthesis and characterization of 1,3-benzoxazines, which can be functional component in terms of application in polymer materials. Moreover, an important aim was to search for new strategies for the synthesis of benzoxazines derivatives and to study the influence of modification of their structural motive on the process of polybenzoxazines synthesis. The doctoral dissertation project has produced a series of non-toxic, bioactive benzoxazines and showed that the aromatic core substitutes are of key importance for biological activity.

The presence of spatially developed substitutes in the *ortho* position deactivates these compounds. Cytotoxicity studies indicate that obtained benzoxazines are safe in the tested doses and may be considered as disinfectants or active ingredients of medicinal products. Furthermore, they form polybenzoxazines with low glass transition temperatures, which also extends their application potential. The structural aspects analysed and their conclusions can be the basis for the design of biologically active benzoxazines analogues. A unique method for the synthesis of ionic 1,3-benzoxazines has been developed in the search for new synthesis routes.

Theoretical studies of the heterocyclic ring durability and potential pathways of decomposition of these compounds as well as experimental verification of thermal properties showed that during heating these derivatives are transformed to classical benzoxazines and chloroalkanes. The structural motive of ionic benzoxazines corresponds to the form of N-activated benzoxazine postulated in the mechanism of benzoxazines polymerization. However, their transformation essentially influences and modifies this mechanism commonly proposed in the literature. Nowadays, this is the only example of such compounds. Further work on optimizing this reaction has led to the synthesis of new sodium coordination compounds with aminophenolates ligands. Six sodium complexes were obtained and characterized in solid and solution and their potential in lactide polymerization reactions was studied. For comparison purposes new compounds of magnesium and zinc with same aminophenolates ligand with a substituent on nitrogen atom as an alkyl chain containing 12 carbon atoms were obtained. Studies on activation of aminophenolates with NaH, which were the basis for the method of ionic synthesis of benzoxazines, led to the development of a unique synthesis of sodium complexes with bis-phenolates and aminobis-naphthalenes, which are formed in situ during the reaction of protection of aminophenol/naphthalen hydroxyl groups in the presence of NaH and methyl iodide. This reaction has an extraordinary potential in the new application of the classic hydroxyl protection group reaction and in the synthesis of organic compounds, macrocyclic ligands. It has produced three new bisphenols sodium complexes. All sodium compounds obtained were characterized by NMR spectroscopy and structural X-ray.

In the course of the work entitled "Functionalized benzoxazines and naphthoxazines as precursors of new materials" a number of unexpected sodium coordination compounds were obtained. The coordination chemistry in this work is a significant piece of work because it is inextricably linked to the research problem explored during the work.