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***Supramolecular synthesis, structure and physicochemical characteristics of selected compounds with pharmacological properties***

**Summary**

In the past decade, crystal engineering has significantly influenced on the development of novel crystalline materials with specific physicochemical properties. The principles of crystal engineering are a key element in the design and synthesis of new materials with the desired physical and chemical properties. Significant interest of co-crystals in the pharmaceutical industry results from the possibility of modifying unfavorable properties of both physicochemical and pharmacological active ingredients without disturbing their biological activity.

The main purpose of this dissertation was the solid state synthesis of cocrystals with antibacterial and antitumor activity (sulfamethazine, sulfathiazole and resveratrol cocrystals), as well as the identification of new polymorphic and pseudopolymorphic forms of active ingredients (5-nitrofurazone and kynurenic acid). The aim of the work was also the synthesis of new biologically active substances according to the principles of green chemistry and crystal engineering (solid state synthesis of amides and imides).

The dissertation contains nineteen new co-crystals (sulfamethazine, sulfathiazole and resveratrol), two new polymorphic forms of 5-nitrofurazone and new crystalline forms of kynurenic acid. The synthesized compounds have been characterized by structural (especially analysis of intermolecular interactions), thermal and spectroscopic properties. This dissertation also contains eight new imides and five new amides synthesized by solid state according to the principles of green chemistry. The synthesized molecules have been tested for cytotoxic and antimicrobial/antitumor activity.