Recently, in the area of design of new drug formulations much attention has been paid to the search for the methods of modification of physicochemical properties of active pharmaceutical ingredients (APIs) in the way needed to maximize the therapeutic effect. The studies proposed in the project fit in this direction of research. Ordered mesoporous carbon materials can be important modifiers of physicochemical properties of APIs. They are able to increase the solubility, chemical stability and permeability through biological membranes. Mesoporous carbons have well-ordered, tunable pore structure, high pore volume and diameter, large surface area, high thermal and mechanical stability.

The ability of ordered mesoporous carbons to incorporate or adsorb active pharmaceutical ingredients that would imply a possibility of modification of APIs solubility and permeability through biological membranes has been a subject of just a few papers. These materials with stronger adsorption capacity compared with other porous materials can improve APIs dispersion and allow a higher degree of active pharmaceutical ingredients loading while limiting APIs recrystallization.

The aim of studies planned within the project is determination of the possibility of application of mesoporous carbons functionalized with different organic groups as APIs carriers modifying the solubility of certain APIs in selected acceptor fluids, increasing their pharmaceutical bioavailability and the chemical stability in the conditions of acid-base hydrolysis, thermolysis, oxidation, photolysis, and improving the APIs permeability through biological membranes. The model APIs chosen for the study are those whose mechanism of pharmacological activity requires algorithms of frequent dosage (paracetamol, benzocaine, tebipenem pivoxil, ampicillin, amphotericin, losartan potassium).

It is expected that in future the results obtained within this project will be used for design of new systems delivering APIs, especially those whose current use in pharmaceutical therapy has been limited because of a low comfort of patients related to the necessity of following the algorithm of frequent dosing.