The development of the techniques of preparation of nanocontainers has attracted particular attention in recent years. A lot of works have been directed towards controlled release strategies to achieve high efficiency of encapsulation of vulnerable molecules by minimizing the degradation by external factors and prolonging time of release. The controlled/sustained release of cargo from different types of micro- and nanocarriers is of considerable interest in applications such as self-healing materials, nutrient preservation, marine industry, fragrance release, and drug delivery.

This approach is particularly important in pharmaceutical applications, especially concerning liphophilic active substances of low bioavailability. By delivering the drug precisely and safely to its site of action at a given period of time it is possible to achieve the maximum therapeutic effect and minimum risk-to-benefit ratio, according to the overall goal of nanomedicine which is "to diagnose as accurately and early as possible and to treat as effectively as possible without any side effects".

The drug delivery systems are generally defined as devices or formulations that are capable of introducing a therapeutic substance into the body in a manner that enhances its efficacy and safety over the two classical methods of drug administration: oral tablets and intravenous injections. Using biodegradable materials for preparation of such carriers provides good tissue compatibility and limits the hypersensitivity reactions. Moreover, appropriate modifications e.g. PEGylation make the blood circulation time is prolonged, improve biodistribution and pharmacokinetics of therapeutic agents, as well as minimize toxicity which is provided by preferential accumulation at the target tissues. Furthermore, multilayer shells of capsules may be tailored for required permeability and functionalized with imaging agents what makes such system provide endless opportunities in modern medicine.

The aim of the project is to obtain drug carriers of core-shell architecture. Surfactant-free method will be used to prepare biocompatible polymeric nanocapsules on liquid cores stabilized by amphiphilic polymers. Cores of the capsules made of non-toxic, natural or synthetic oils, will be stabilized by hydrophobic arms anchored in oil droplets (Fig. 1). Obtained nanocapsules will be used as carriers of liphophilic bioactive compounds of low bioavailability. Hydrophobicity of such compounds decreases the therapeutic effect and causes high doses of drugs are needed to provide successful therapy.

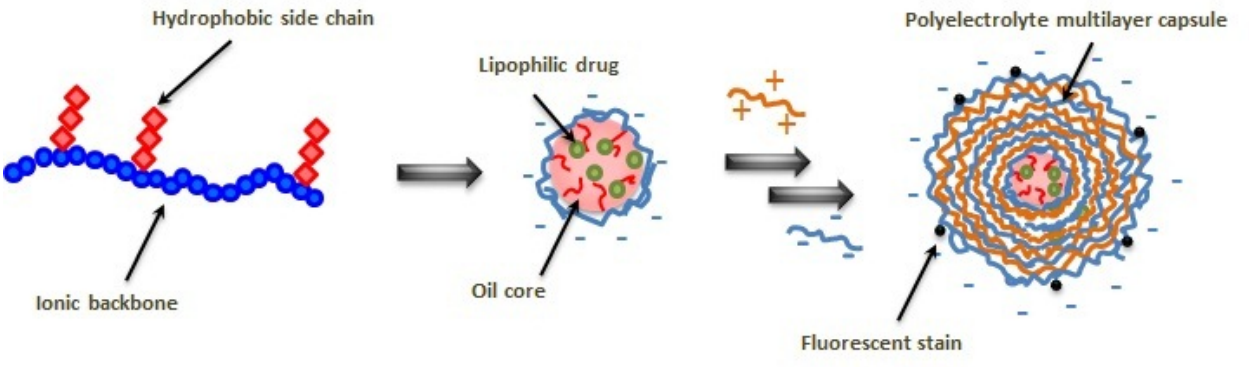

Figure 1 Preparation of multilayer capsules stabilized by hydrophobically modified polysaccharides.

The achievement of controlled and sustained release of drugs from colloidal carriers combined with a simultaneous diagnosing is of particular importance as it may provide the key to an effective therapy and personalized medicine. It also highlight the importance of nanotechnology in the modern world of science.