# Project summary

Research activities of the project TR34031 have begun in 2010. The overall goal of the project is development of innovative (enhanced) formulations and optimization of laboratory-scale preparation procedures for the selected groups of micro- and nanosystems as prospective carriers for model drugs with highly demanding physico-chemical characteristics, expressing anti-inflammatory, antioxidant, anticancer and antimicrobial effects. As an essential part of such research, the formulation development was simultaneously conducted with the development of suitable characterization methods for these drug delivery systems (*in vitro*, *ex vivo* and *in vivo* methods). The emphasis was placed on application of biocompatible functional materials of natural orogin in innovative delivery systems. Research segments were classified in four main parts based on the type of the carrier being investigated:

1. Formulation research of semisolid pharmaceutical and cosmetic preparations stabilized by biosurfactants, and research of SWitch Oil Phase emulsions, topical film-forming systems and emulsion systems enriched with biopolymers (such as natural polymer levan);
2. Formulation research of nanodispersed systems (biocompatible microemulsions, high- and low-energy nanoemulsions, dispersions of lipid nanoparticles, nanostructured lipid carriers, nanocrystals);
3. Formulation research of alginate-chitosan microparticles;
4. Research of formulations based on modified zeolites.

Apart from the significant scientific contribution, which is an imperative in these research activities, the goal is to enable a direct applicability of some obtained results by certain business entities and/or academic/research institutions in Serbia or abroad.

Intense international collaboration on joint tasks with colleagues from Germany, Greece and Great Britain should be emphasized as a special value of this project, as well as cooperation with research institutions in our country, which is reflected in mastering and adapting contemporaneous methodologies and improvement of researchers’ competences. Research activities are constantly being supplemented by new goals which are in accordance with current international research tendencies.

Keywords: micro- and nanosystems, innovative formulations for delivery of actives, biocompatible excipients,

# Sažetak projekta

Istraživanaja na projektu TR34031 započeta su 2010. godine, i imaju za cilj razvoj inovativnih formulacija i optimizaciju postupaka izrade (na laboratorijskom nivou) za određene grupe mikro- i nanosistema kao prospektivnih nosača za model aktivne supstance veoma zahtevnih fizičko-hemijskih karakteristika, a koje ispoljavaju antiinflamatorno, antioksidativno, antikancerogeno i antimikrobno delovanje. Kao neizostavni deo ovakvih istraživanja jeste i razvoj pogodnih metoda za karakterizaciju ovih nosača aktivnih supstanci, a koji se sprovodi uporedo sa formulacionim istraživanjima (*in votro, ex vivo* i *in vivo* metode karakterizacije). Fokus je na primeni biokompatibilnih funkcionalnih materijala u inovativnim sistemima za isporuku. Osnovni segmenti istraživanja grupisani su u zavisnosti od tipa istraživanog nosača, tako da postoje 4 osnovne celine:

1. Formulacije farmaceutskih preparata i kozmetičkih proizvoda polučvrste konzistencije, stabilisani biosurfaktantima, te istraživanje emulzija sa brzim inferzijom faza, emulzionih sistema sa biopolimerima, i film-formirajućih sistema za primenu na koži;
2. Formulacije nanodisperznih sistema (biokompatibilne mikroemulzije, visoko- i niskoenergetske nanoemulzije, nanostrukturirani lipidni nosači, disperzije lipidnih nanočestica, nanokristali);
3. Formulacije tipa alginat-hitozan mikročestica;
4. Formulacije na bazi modifikovanih zeolita.

Pored imperativa značajnog naučnog doprinosa, cilj istraživanje jeste i direktna primenjivost dela dobijenih rezultata (u privredi ili drugim naučno-istraživačkim institucijama u zemlji i inostranstvu).

Kao posebnu vrednost projekta treba istaći intenzivnu međunarodnu saradnju na zajedničkim zadacima sa kolegama iz Nemačke, Grčke i Velike Britanije, ali i značajnu saradnju sa istraživačkim institucijama u našoj zemlji, a koja se ogleda u osvajaju i unapređenju/prilagođavanju novih i savremenih metodologija i unapređenu kompetencija angažovanih saradnika/istraživača. Aktivnosti na projektu kontinuirano se dopunjuju podciljevima i strategijama koje su u skladu sa aktuelnim svetskim istraživačkim tendecijama.

Ključne reči: mikro- i nanosistemi, inovativne formulaciju za isporuku aktivnih supstanci, biokompatibilni ekscipijensi

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