# Project summary

The III46010 project research is a new concept in the development of bioprocess technologies that are crucial for improving the quality, competitiveness and safety of food and dietary supplements. It is planned that optimization of bioprocessing conditions will enable to obtain the carriers of characteristics suitable for their incorporation into the final product with the possibility of achieving an enhancement in nutritional and biological value, safety and safety of food and dietary supplements. New biotechnologies include the use of microparticle carriers and micro- or nano emulsions, as a carrier of biologically active substances and biocatalysts and their integration into food products. One of the project results will be to solve formulation problems in the development of biocompatible phospholipid based micro- and nanocarriers (poloxamer/lecithin hydrogels, liposomes, phytosomes) and nanodispersion systems of the microemulsion type and microemulsion hydrogels that can be obtained by introducing biocompatible polymers (xanthan gum, poloxamer). These systems can be used as carriers for encapsulation of active substances of various physicochemical characteristics, including phytoconstitents, which significantly influence their stability, biopharmaceutical profile and the possibility of absorption *via* biological membranes. It is expected that through the interdisciplinary activities of the project participants, within this project and beyond, will be realized network cooperation, which will contribute to the further improvement of the development of new quality, safe and competitive food and pharmaceutical products on the world market.

# Sažetak projekta

Istraživanja na projektu III 46010 predstavljaju nov koncept u razvoju bioprocesnih tehnologija koje imaju ključni značaj za poboljšanje kvaliteta, konkurentnosti i bezbednosti hrane i dijetetskih suplemenata. Planirano je da se optimizovanjem bioprocesnih uslova dobiju nosači zadatih karakteristika za njihovo inkorporiranje u finalni proizvod sa mogućnošću da se postigne povećanje nutritivne i biološke vrednosti, sigurnosti i bezbednosti hrane i dijetetskih suplemenata. Nove biotehnologije obuhvataju primenu mikročestica i mikro- ili nano emulzija, kao nosača biološki aktivnih supstanci i biokatalizatora i njihovo integrisanje u proizvode prehrambene industrije. Jedan od rezultata istraživanja biće rešavanje formulacionih problema u razvoju biokompatibilnih nosača za mikro- i nanoinkapsulaciju na bazi fosfolipida (poloksamer/lecitinski hidrogelovi, liposomi, fitosomi) i nanodisperznih sistema tipa mikroemulzija i mikroemulzionih hidrogelova koji se mogu dobiti uvođenjem biokompatibilnih polimera (ksantan guma, poloksamer). Navedene sisteme je moguće upotrebiti kao nosače za inkapsulaciju aktivnih supstanci različitih fizičkohemijskih karakteristika, uključujući i sastojke biljnog porekla, čime se značajno utiče na njihovu stabilnost, biofarmaceutski profil i mogućnost apsorpcije preko bioloških membrana. Očekuje se da će se povezivanjem interdisciplinarnih aktivnosti realizatora projekta ostvariti umrežena kooperacija, koja bi u okviru ovog projekta, a i ubuduće, doprinela daljem unapređenju razvoja novih kvalitetnih, bezbednih i konkurentih prehrambenih i farmaceutskih proizvoda na svetskom tržištu.

# Selected results/Odabrani rezultati

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**Selected chapters in the international proceedings**

**Odabrana poglavlja u monografijama/tematskim zbornicima sa međunarodnih skupova (M14)**

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2. Djekic L, Krajisnik D. Properties and Biomedical Relevance of Phytosome Encapsulated Polyphenolics. In: Clark P, editor. Polyphenolics: Food Sources, Biochemistry and Health Benefits. Hauppauge: Nova Science Publishers; 2017. p. 21-56 (ISBN: 978-1-53610-725-8).
3. Djekic L. Liposomes: Properties and Therapeutic Applications. In: Keservani RK, Sharma AK, Kesharwani RK, editors. Novel Approaches for Drug Delivery. Hershey: IGI Global; 2017. p. 27-51 (ISBN13: 9781522507512).
4. Djekic L, Martinovic M, Primorac M. Microemulsion Hydrogels – Properties and Current Applications in Drug Delivery. In: Torres T, editor. Microemulsions: Systems, Properties and Applications. Hauppauge: Nova Science Publishers; 2017. p. 1-36 (ISBN: 978-1-63485-890-8).

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