

**Kratek opis usposabljanja mladega raziskovalca** (*Short description of the Young Researcher's training*)

1. Raziskovalna organizacija (*Research organisation*):

Univerza v Ljubljani, Biotehniška fakulteta

2. Ime, priimek in elektronski naslov mentorja (*Mentor's name, surname and email*):

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3. Šifra in naziv raziskovalnega področja (*Research field*):

4 Biotehnika

4.03 Rastlinska produkcija in predelava

4. Kratek opis usposabljanja mladega raziskovalca (*Short description of the Young Researcher's training*):

Navedite tudi morebitne druge zahteve, vezane na usposabljanje mladega raziskovalca (npr. znanje tujih jezikov, izkušnje z laboratorijskim delom, potrebne licence za usposabljanje...).

*slo:*

V okviru raziskovalnega programa P4-0121 »Biokemijska in biofizikalno-kemijska karakterizacija naravnih spojin« se že vrsto let ukvarjamo s fenolnimi spojinami, ki so rastlinski sekundarni metaboliti in imajo mnogo dokazanih in vitro (preprečujejo različne vnetne in degenerativne procese). Delujejo kot naravno prisotna protimikrobna sredstva, ali kot snovi, ki povečajo oksidativno stabilnost živilskih izdelkov. Pozornost v najnovejših raziskavah je usmerjena na preučevanje biološke dostopnosti in stabilnosti teh spojin, ne samo med predelavo hrane in skladiščenjem (temperatura, kisik, pH in svetloba), pač pa tudi med presnovo v prebavilih (pH, encimi, druge hranilne snovi) in med mikrobnimi pretvorbami v debelem črevesu. Tehnologija mikro in nanokapsuliranja bioaktivnih snovi v različne nosilne materiale ščiti te občutljive spojine in povečuje možnosti za njihovo uporabo v različnih živilskih in farmacevtskih izdelkih.

Kapsuliranje tudi omogoča razvoj funkcionalnih premazov pakirnih materialov, ki zavirajo rast mikrobov in zmanjšujejo kontaminacijo in s katerimi izboljšujemo senzorične lastnosti (vonj, barvo in okus) živil. Za ohranjanje in zaščito funkcionalnih lastnosti aktivnih komponent se v kozmetični in farmacevtski industriji za nosilce različnih spojin (protimikrobnih sredstev, antioksidantov, arom in bioaktivnih snovi) že vrsto let uporabljajo liposomi, vezikli obdani z lipidnimi dvosloji. Njihova struktura omogoča kapsuliranje hidrofilnih in hidrofobnih komponent in njihovih kombinacij. Liposomi, pripravljene iz naravnih fosfolipidov, so biološko kompatibilni in razgradljivi, torej praktično ne povzročajo alergične, toksične, antigenske ali pirogenske reakcije. Odkritje novih lipidov v arhejah, ki tvorijo liposome (arheosome), ki so stabilni pri visoki temperaturi, pri nizkem ali visokem pH ter odporni na delovanje fosfolipaz, žolčnih soli in v serumu ter v mešanicah s konvencionalnimi lipidi sestavljenimi iz diestrov, omogoča razvoj novih dostavnih sistemov za zdravila (bioaktivne komponente, encime).

Mladi raziskovalec bo delal na prioritarnih področjih raziskovalnega programa P4-0121 »Biokemijska in biofizikalno-kemijska karakterizacija naravnih spojin«. Cilj usposabljanja bo razvoj novega kapsulacijskega sistema na osnovi arhealnih lipidov za kapsulacijo biološko aktivnih molekul (encimov).

### **Izobrazba in izkušnje**

Izobrazba biotehniške, naravoslovne ali tehniške smeri.

Izkušnje pri delu v laboratoriju z analitsko in raziskovalno opremo na področju delovanja skupine so dobrodošle.

*eng:*

In the framework of the research group P4-0121 »Biochemical and biophysical characterization of natural compounds« we are investigating the phenolic compounds, which are secondary metabolites of plants and have many in vitro proven effects to prevent various inflammatory and degenerative processes. They act as antimicrobial and naturally occurring or added they influence oxidative stability of food products, too. A big question of the most recent research is their bioavailability and stability not only during food processing and storage (temperature, oxygen, pH, and light) but their metabolism in the gastrointestinal tract (pH, enzymes, other nutrients) and effect of microbiota in the colon. Potential benefits of phenolic compounds are limited by their stability during food processing and storage, and bioavailability. Micro and nanoencapsulation of bioactive compounds into different carrier materials protects the core compounds and enhances their application in food and pharmaceutical industry. In addition, encapsulation can provide new approaches for food packaging by introducing functional coatings, for avoiding microbial growth and contamination, for enhancing the sensorial properties (e.g. flavor, color and taste). Lipid bilayer vesicles known as liposomes have been extensively studied as carriers for numerous compounds (antimicrobials, antioxidants, flavors and bioactive elements) in cosmetic and pharmaceutical industries with the aim to entrap and shield their functionality. Also, they can be used for encapsulation of both hydrophilic and hydrophobic components and their combinations. Liposomes prepared from natural phospholipids are biocompatible and biodegradable, and consequently cause little or no antigenic, pyrogenic, allergic or toxic reactions. The discovery of new archaeal lipids that form liposomes (**archaeosomes**) that are stable at high temperature, low or high pH, resist even in the presence of phospholipases, bile salts and serum and even in mixtures with conventional diester lipids has led to the development of new potential drug (bioactive compounds, enzymes).

The young researcher will work on the priority topics of the research program P4-0121 »Biochemical and biophysical characterization of natural compounds«. The main aim of the research will be the development of the new delivery system based on archaeal lipids for encapsulation of bioactive molecules (enzymes).

### **Education and experiences:**

Biotechnology, Biochemistry, Natural sciences, Food science.

Experiences with analytical and research equipment used in n the field of our research are welcomed.