

Opis delovnega mesta mladega raziskovalca/ke (*Description of the Young Researcher's position*)

1. Članica UL (*UL member*):

Fakulteta za kemijo in kemijsko tehnologijo

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

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3. Raziskovalno področje (*Research field*):

Ekološko inženirstvo

4. Opis delovnega mesta mladega raziskovalca/ke (*Description of the Young Researcher's position*):

Vključuje morebitne dodatne pogoje, ki jih mora izpolnjevati kandidat/ka za mladega raziskovalca/ko, ki niso navedeni v razpisu za mlade raziskovalce.

slo:

Onesnaževanje s plastiko je eno najbolj problematičnih okoljskih vprašanj, še posebej onesnaževanje z mikroplastiko, ki jo zdaj najdemo skoraj povsod po svetu. Mikroplastika v okolje vstopa predvsem iz virov na kopnem, reke pa jo nato prenašajo naprej v morja in oceane. Raziskave na področju mikroplastike so se osredotočale predvsem na različne vire mikroplastike in na to, kako mikroplastika vstopa v okolje. Veliko študij je bilo usmerjenih v raziskovanje mikroplastike v odpadnih vodah in njihovo odstranjevanje v čistilnih napravah. Mikroplastika pa lahko nastaja tudi s fragmentacijo plastičnih odpadkov v naravnem okolju, ampak o njeni usodi v okolju je znano zelo malo.

V tem kontekstu je cilj raziskave preučiti obnašanje in usodo mikroplastike v vodnem okolju. Najprej bomo raziskali okoljsko staranje različnih tipov mikroplastike. Poudarek bo na spremljanju sprememb lastnosti mikroplastike (velikost, gostota, morfologija in spremembe v kemijski sestavi) in na ovrednotenju biorazgradnje mikroplastike zaradi tvorbe biofilma. Raziskali bomo tudi, kako okoljski parametri, kot so svetloba, valovanje in vsebnost hranil, vplivajo na razvoj in sestavo biofilma ter s tem na lastnosti mikroplastike in stopnjo razgradnje. Podatke bomo uporabili za zasnovo modela, s katerim bi lahko predvideli staranje in biorazgradnjo različnih vrst mikroplastike v vodnem okolju. V drugem delu se bomo osredotočili na transport nestarane in starane mikroplastike v vodnem okolju in spremljali interakcije med mikroplastiko in sedimentom oziroma biotskimi površinami kot so npr. bentični biofilmi. S pomočjo kinetičnih modelov in določitvijo izoterm bomo opisali mehanizme adsorpcije mikroplastike na sedimente in biofilme ter preučili vpliv okoljskih procesov na te interakcije. Raziskali bomo tudi vpliv adsorbirane mikroplastike na funkcije biofilma, zlasti vpliv na heterotrofno in avtotrofno aktivnost, ki sta ključna procesa odgovorna za kakovost naravnih vod. S pomočjo teh raziskav bomo močno izboljšali naše razumevanje procesov in sprememb, ki spremljajo vnos mikroplastike v vodno okolje.

Od kandidata se poleg izobrazbe kemijskega inženirstva pričakuje poglobljeno znanje ter delovne izkušnje na področju okoljskih raziskav. Poleg tega so zelo dobrodošle tudi izkušnje z raziskavami na področju mikroplastike. Kandidat mora izkazovati tudi zadostne komunikacijske sposobnosti v angleškem jeziku.

eng:

Plastic pollution has become one of the most important environmental issues today, and microplastics, which have been found virtually everywhere in the world, are of particular concern. Microplastics originate primarily from land and are then carried by rivers into the seas and oceans. Recent microplastics research has focused on the sources of microplastics and how they enter the environment. Much effort has gone into researching microplastics in wastewater and their removal in wastewater treatment plants. However, microplastics can also be formed in the natural environment through fragmentation of plastic waste, and very little is known about their subsequent fate in the environment.

In this context, the aim of the research is to study the behavior and fate of microplastics in the aquatic environment. First, we will investigate the environmental aging of different microplastics. The focus will be on changes in microplastic properties (size, density, morphological and chemical changes) and biodegradation through biofilm formation. We will also investigate how environmental parameters such as light, water movement, and nutrient levels affect biofilm development and composition, and thus microplastic properties and the degree of degradation. We will combine the data into a model that can be used to predict the aging and biodegradation of different microplastics in the aquatic environment. In the second part of the research, we will focus on the transport of both pristine and aged microplastics into the water body and how they interact with sediment and large biotic surfaces such as benthic biofilms. We will apply adsorption kinetic and isotherm models to understand the mechanisms of microplastic adhesion to sediments and biofilms and how these interactions are affected by environmental processes. In addition, we will investigate the effects of adhered microplastics on biofilm ecosystem functions, particularly the effects on heterotrophic and autotrophic activity, which are critical biological processes for natural water quality. Ultimately, the results of this research will greatly enhance our understanding of the effects, fate, and behavior of microplastics in the aquatic environment.

In addition to a basic education in chemical engineering, a successful candidate is expected to have in-depth knowledge and work experience in environmental research; experience with microplastics research is a strong advantage. The applicant must have sufficient communication skills in English.