

The University of Bayreuth is a research-oriented university with internationally competitive, interdisciplinary focus areas in research and teaching and now offers for the newly established interdisciplinary **Collaborative Research Centre 1357 MICROPLASTICS** - *Understanding the mechanisms and processes of biological effects, transport and formation: From model to complex systems as a basis for new solutions*, **22 PhD positions** (longest possible fixed-term until 31.12.2022) in the field of microplastics on **A)** biological effects, **B)** environmental behaviour and migration, **C)** degradation mechanisms and solutions.

Short description of CRC

The ubiquitous contamination of the environment with microplastics (MPs), the associated potential risks to ecosystems and ultimately to human health has recently attracted a great deal of public and scientific attention. However, a fundamental understanding of the physical, chemical and biological processes to which MP is subjected in the environment is lacking at present. Therefore, the aim of this CRC initiative is to gain a fundamental understanding of the processes and mechanisms (A) that cause biological effects of MP in limnic and terrestrial ecosystems (B) that influence migration of the MP particles in and between environmental compartments and (C) that cause the formation of MP from macroscopic plastics each depending on the physical and chemical properties of the plastics. Building on this, new environmentally friendly plastics in the sense of sustainable polymer chemistry are to be developed.



The short descriptions of open positions are as follows. The place of employment for all vacancies is Bayreuth except otherwise stated.

PhD-A01a: Investigation of possible effects of MPs depending on the physical and chemical parameters on aquatic model organisms on a molecular level and investigation of indirect negative effects of MPs via changes of the intestinal microbiome.

PhD-A01b: Effects of MPs on the proteome of the model organism *Daphnia* are to be investigated using modern mass spectrometric and bioinformatics processes (Place of employment: LMU Munich).

PhD-A02: Effects of MP-particles on the microbiome of soil-dwelling terrestrial model macrofauna will be addressed with metabolomics and metatranscriptomics (Place of employment: LUH Hannover).

PhD-A03: Characterization of the effects of MPs on tissue level using imaging techniques. A combination of spectroscopic and mass spectrometric methods (e.g. MS Imaging) is used.

PhD-A04: Using modern characterization methods (with a focus on atomic force microscopy/force spectroscopy), it will be investigated how interfacial interactions and mechanical properties of MP-particles change when exposed to the environment and how these changes correlate with the uptake and internalization of the particles by cells.

B01 addresses the surface properties of MP-particles as well as their change upon adsorption of natural colloidal components by exposure to aquatic environments.

PhD-B01a: Application of colloid chemical techniques and direct force measurements by AFM.

PhD-B01b: Structural investigations of the interfaces by solid-state NMR spectroscopy.



PhD-B02a: We are looking for a motivated PhD candidate to conduct laboratory and field experiments to quantify physical and biological MP transport processes in lakes.

PhD-B02b: This PhD project investigates the mechanisms of transport and fate of MP in standing waters and lake systems using numerical simulations (CFD) (Place of work: Helmholtz Center for Environmental Research UFZ, Leipzig). Further information:

http://www.hydro.uni-bayreuth.de/hydro/de/stellen/diss/detail.php?id_obj=149758

PhD-B03a: Investigation of the hydrodynamic transport behavior of micro-plastics in open channel flow and the hyporheic zone (http://www.hydro.uni-bayreuth.de/hydro/de/stellen/diss/ang_stellen.php).

PhD-B03b: This PhD project investigates the mechanisms of transport and fate of MP in the open-water and hyporheic zone of fluvial systems using numerical simulations (CFD) (Place of work: Helmholtz Center for Environmental Research UFZ, Leipzig). Further information:

http://www.hydro.uni-bayreuth.de/hydro/de/stellen/diss/detail.php?id_obj=149758

PhD-B04: This project focuses on experiments to quantify water-air transfer rates of MP particles as a function of polymer properties and to study the mechanical stress associated with the water-air transfer process (Place of Employment: TU Berlin).

PhD-B05a: The project investigates processes of atmospheric transport and dispersion of MPs using experiments in a laboratory wind tunnel in combination with modern flow simulations in a riparian zone.

PhD-B05b: In this project, atmospheric transport processes of MP particles will be studied using aerosol measuring instrumentation in wind tunnel experiments (Place of Employment: TU Berlin).

PhD-B06a: Investigation of the transport of MPs in soil (physical transport, influence of biota) and on the soil surface (erosion, transition to the atmosphere) in irrigation and erosion experiments. The position will be based at the University of Cologne after an initial phase at the University of Bayreuth.

PhD-B06b: Investigation of the transport of MPs in soil with a strong focus on detection, visualisation and quantification of MPs in soils (fluorescence and spectroscopic methods, as well as computer tomography) and effects of biota in close cooperation with project B06a.

C01 aims at developing an understanding for the formation of MPs from macroscopic plastic parts and the further decay of MPs due to weathering by exposure with UV radiation, water and mechanical forces.

PhD-C01a: Development of platforms for accelerated weathering of sets of plastics.

PhD-C01b: Investigation of mechanical properties of plastic parts as function of the annealing time.

PhD-C01c: Analyzing structural changes within the MP-particles by advanced analytical techniques like solid-state NMR spectroscopy

PhD-C02: Environmentally friendly, sustainable biopolymers will be enabled for (food-) packaging via compounding with home-made synthetic clays to improve mechanical strength and gas barrier. A degree in chemistry and a background in clay science or nanocomposites is greatly appreciated

PhD-C03: In the project the interaction of proteins with MP-particles will be investigated using computer simulations. In addition, the search for novel plastic-degrading enzymes will be supported by bioinformatic analysis.

PhD-C04: The effect of microbial diversity on degradation mechanisms of MPs in the environment will be addressed by innovative enrichment strategies, (meta-)omics, isotope tracing, stable isotope probing and bioinformatics (Place of employment: LUH Hannover).



The candidates with the following general profile are encouraged to apply:

- A very good Master's thesis in biology, chemistry, physics, materials science or environmental science, possibly with reference to microplastics research. The master degree should meet the requirement given in the description of the particular PhD position.
- You enjoy working independently and well-structured together with an interdisciplinary team contributing to a highly topical and socially relevant field.
- You show outstanding commitment, high flexibility, can cope with a higher workload, are team-oriented and have excellent communication skills.
- You have very good command (written and spoken) of English language.

If personal and formal requirements are met, the salary will be E 13 TV-L (65 - 100% depending on the respective position). Employment is longest possible fixed-term until 31.12.2022 (end of the project). Applications from handicapped persons will be favored when all other qualifications are equal. The University of Bayreuth is an equal opportunity employer and we therefore especially encourage women to apply.

Please send your application (containing CV, cover letter mentioning specific PhD position applied for, certificates etc.) **exclusively by email** in a single attached pdf-file (max. 30 MB) to microplastic@uni-bayreuth.de by March 15th 2019.