TECHNICAL
WEAVERS FOR
INDUSTRY +
ARCHITECTURE

GKD WORLD WIDE WEAVE

WATER PROCESSING

MICROPLASTICS - A GLOBAL CHALLENGE

MICROPLASTICS – AN INVISIBLE DANGER TO THE ENVIRONMENT

Microplastics: barely visible but omnipresent. Around 60 years ago, mankind began using plastics for a huge variety of applications, from highly technical construction materials to plastic bags. The widespread and often excessive use, by both industry and private individuals, is having a negative effect on the environment. Plastic bottles, packaging, and bags in rivers and oceans are an ugly yet all too familiar image. Increasingly, more attention is being paid to the problem of microplastics in waters, too.

Microplastics are plastic particles that are no bigger than 5 mm. Some of the particles are produced in these dimensions and used in products such as cosmetics, or they are generated through the breakdown of larger plastic parts such as coffee cup lids, car tires, or synthetic textiles. As far as we know today, tire abrasion is the largest source of entry. Although these are tiny particles, it is estimated that around 180,000 t of microplastics are emitted into the environment each year in Germany alone. Because




Main sources are tire abrasion, microparticles from plastic in cosmetics, detergents, and cleaning products, as well as chemical fibers that are washed out of synthetic textiles.

of the low density (0.8 g/cm³ – 2.2 g/cm³) of synthetic polymers, these are washed away particularly easily in drainage water. A number of studies have shown us that modern sewage plants are able to remove approximately 98% of microplastic particles, yet the absolute amounts highlight a need for further action: the amount of plastic particles that pass through sewage plant filters and then gather in waters is still considerable. GKD - Gebr. Kufferath AG has is working on the OEMP and Tire Abrasion in the Environment research projects funded by the BMBF (German Federal Ministry of Education and Research). The aim is to investigate contamination sources, characterize types and amounts of particles, and develop effective solutions. With our expertise and production capabilities, we are driving forward the development of highly efficient filter methods for microplastic removal.

OEMP*

Optimized Materials and Procedures for Removing Microplastics from the Water Cycle: The group project is dedicated to the topic of microplastics in municipal waste water. In order to ensure the retention of different microplastic particles (size, form, material) in various contamination sources of urban water management, the focus is on developing new filter materials and processing technology. Furthermore, the retention capability of simple, natural systems (ground filters) is being investigated. To explore both technical and natural solution approaches, quality assurance that includes evaluable research methodology is required which will also take place within the scope of the project. GKD - Gebr. Kufferath AG acts as OEMP Project Director and is also developing a novel filtration mesh for optimized microplastic removal. The main area of use of this new mesh is the treatment of municipal waste water in a sewage plant. The requirements are: reliable filtration, high throughput, long service life. This resulted in the development of the new Optimized Dutch Weave 6 (ODW6).

Project goals:

- Development of innovative retention systems for microplastics
- On-site sampling with materials developed in the project
- Development of a standardized sampling concept
- Analysis procedure for identifying microplastics from environmental samples

Project duration: 01.04.2016–31.09.2018

Project partners

GKD - Gebr. Kufferath AG, Technical University of Berlin Department of Urban Water Management, German Federal Environment Agency, German Federal Institute for Materials Research and Testing (BAM), INVENT Umwelt- und Verfahrenstechnik AG, Mecana Umwelttechnik GmbH, Funke Kunststoffe GmbH, MeierGuss Limburg GmbH, Berlin Center of Competence for Water, Berliner Wasserbetriebe

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OE/MP

MachWas
MATERIALIEN FÜR EINE NACHHALTIGE WASSERWIRTSCHAFT

GEFÖRDERT VOM
Bundesministerium für Bildung und Forschung

RAU*

Tire Abrasion in the Environment: Increased traffic volume inevitably leads to an increase in tire abrasion. The resulting microplastic finds its way into the aquatic environment via various entry points. The amount of abrasion from a tire and the entry of microplastics via road runoff have not yet been researched in detail. This is where the Tire Abrasion in the Environment Project begins. Within the project, tire particles from the usage phase of a tire are described in detail. If necessary, endeavors will also be made on a theoretical basis to explain measured differences in the losses of tire particles over the entire lifecycle. The aim is to identify and balance the entry paths of tire material into the aquatic environment and to highlight measures for reducing entry into the environment. One of the greatest challenges is taking samples from the water that is washed into road runoff. As an expert in filtration processes, GKD - Gebr. Kufferath AG has taken on this task and is constructing the necessary sampling basket. What's special about it is this: washed-up particles of road dirt are sorted by size in the basket using filter layers made from metal mesh. The finest filter level consists of the Optimized Dutch Weave 6 (ODW6), which has already proved its worth in the OEMP Project. As the basket is used in active road traffic, its design must prevent overflow and ensure a constant flow.

Project goals

- Development of a solid/liquid separation device for sampling road runoff water
- Development of an analysis procedure for qualitative and quantitative determination of the proportion of tire abrasion from an environmental sample
- Description of the abrasion and ablation behavior of tires
- Verification of selected measures for reducing the entry of tire material into the aquatic environment
- Development of an evaluation matrix that makes it possible to derive suitable measures for different locations

Project duration: 01.08.2017–31.07.2020

Project partners

GKD - Gebr. Kufferath AG, Technical University of Berlin Department of Urban Water Management, ADAC e.V., Berliner Stadtreinigung, Berliner Wasserbetriebe, Continental AG, Engineering Bureau Prof. Dr. Sieker mbH, Technical University of Berlin Department of System Dynamics and Frictional Physics, Volkswagen Group Research, WESSLING GmbH, ORI Abwassertechnik GmbH & Co. KG

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REIFENABRIEB IN DER UMWELT

Plastik in der Umwelt

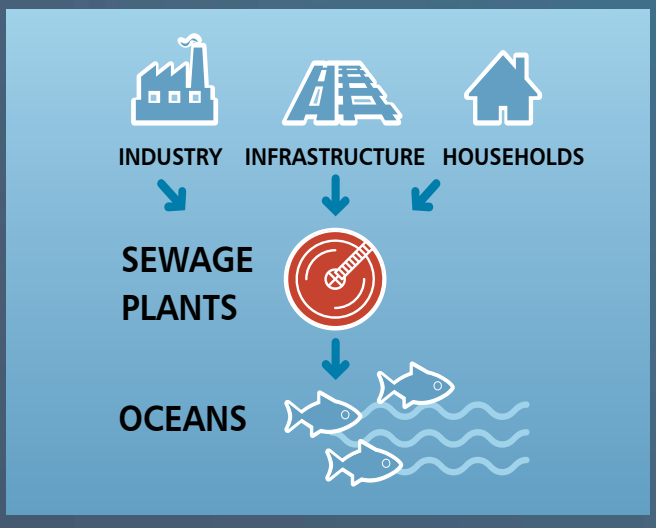
FONA Forschung für Nachhaltige Entwicklung BMBF

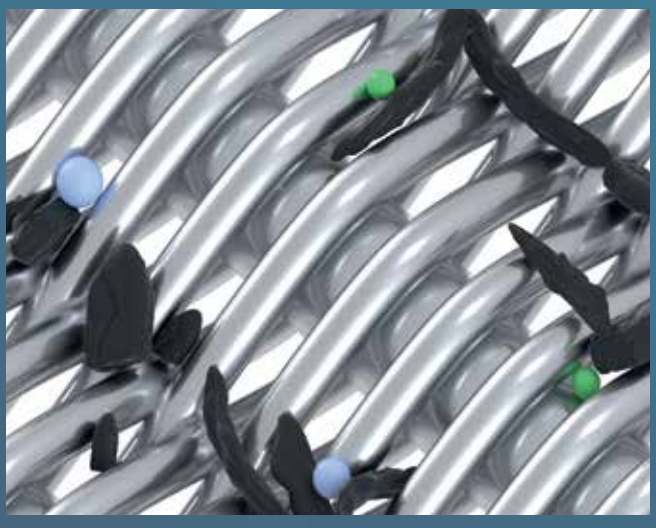
Bundesministerium für Bildung und Forschung

ODW6
THE OPTIMIZED DUTCH WEAVE

A large proportion of the water contaminated with microplastics is treated in sewage plants. Nevertheless, the tiniest of plastic particles pass through the sewage plant filters and find their way into surface waters such as lakes, rivers, and oceans. Optimized filter materials for improved removal of microplastic particles are required as a high-performance alternative to larger filter equipment. This is precisely where GKD is focusing its efforts with ODW6.

The challenge: In sewage plants, large volumes of water have to be treated in a relatively short time and high volumetric flows need to be dealt with. In the filtration level, large and complex equipment would be required to increase the filtration performance. Unless, that is, the filters of smaller plants are able to perform to an equally high level. Our response: As large, high-performance plants are





not only costly but also require space, we rise to the challenge with our newly developed „Optimized Dutch Weave" ODW6. It was developed as part of the OEMP project funded by the German Federal Ministry of Education and Research and had to prove its worth in practical application right from the outset. After the required performance had been confirmed in laboratory tests, the high-performance mesh was tested in the Ruhleben sewage plant in Berlin under real conditions, where it filtered treated water from the runoff of the sewage plant. The excellent regenerability through backwashing and the high flow rates quickly showed success. ODW6 was able to reduce the proportion of filterable substances by half in comparison with the filter media currently used in Berlin.

ODW6: THE FILTER BASKET

In the Tire Abrasion in the Environment project run by the German Federal Ministry of Education and Research, operational capability and suitability for daily use are more than just buzzwords. Our filter basket – with ODW6 in the smallest filter fraction – is used in active road traffic and must meet the requirements of road safety and guarantee road drainage, despite its filter function, even in heavy rain.

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