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TZW
news

The Newsletter issued by TZW
The German Water Centre

Issue 8, 09/2019

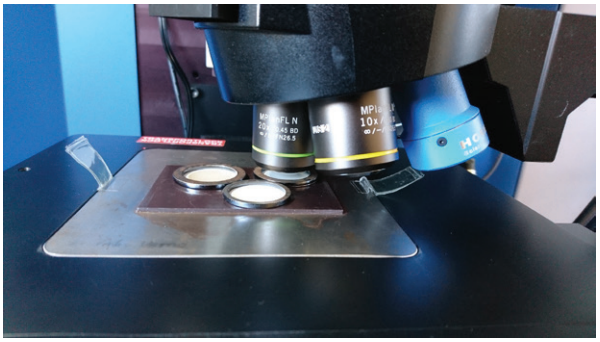
MICROPLASTIC ANALYSIS OF WATER SAMPLES

TZW has established new methods for the analysis of microplastic particles in water samples down to 5 µm particle size.

In recent years, research in the field of microplastic analysis has increased greatly. Microplastics (synthetic polymer particles with diameters of 1 µm to 5 mm) have been discovered in various environmental matrices like biota, sediments, surface waters and seawater as well as in food and mineral water.

Due to missing standardization of sampling, sample preparation and analysis methods (e.g. pyrolysis gas chromatography mass spectrometry, micro-Fourier-transform infrared spectroscopy (µ-FTIR) and Raman-microspectroscopy (µ-Raman)), research results are in many cases not comparable and often not resilient.

A method developed at TZW has been validated and is based on a fractionated filtration unit. This filtration unit consists of three brass filter cartridges, each equipped with a stainless steel filter mesh with various meshsizes (100 µm, 20 µm, and 5 µm). It is suited to sample surface water as well as processed drinking water with a sample volume between 0.3 m³ and 14 m³. During the sampling procedure, particles are enriched on the stainless steel filters and can afterwards be extracted from the filter meshes using ultrasonic extraction. The extracts for drinking water samples are directly filtered over PTFE filter membranes and analysed, while surface water extracts require a clean-up (e. g. density separation, organic digestion) before final filtration. Samples are analysed by confocal µ-Raman microscopes (Horiba Jobin XploRA PLUS and LabRAM HR Evolution). At least 20 - 50 % of the filter area is measured and the obtained spectra are semi-automatic compared with databases for particle identification.



Microplastic analysis with Raman-microspectroscopy

Validation

The analysis procedure was validated by a recovery test with reference microplastics of different polymer types and sizes (5 µm - 250 µm in particle diameter). The validation of the method, including sampling, sample preparation and analysis yielded an average overall recovery of 81%. The retention capacity of the filtration unit was confirmed by a particle counter test for particles above 10 µm. As quality control a process blank is analysed regularly. Currently the TZW is developing a supplementary µ-FTIR analytical method.

Sampling procedure

Nicole Zumbülte,
Water Chemistry Research

UVC-LEDs: A quantum leap for UV-drinking water disinfection?

Resource preservation is becoming increasingly important in the drinking water sector. Hence, the use of ultraviolet light emitting diodes (UV LEDs) is seen as a possible new, highly efficient alternative to the established mercury lamp technology.

Over the past six years, TZW has participated in several research projects in the field of UVC-LED-based water treatment. Particularly noteworthy are the joint projects performed within the "Advanced UV for Life" research consortium, funded by the German Federal Ministry of Education and Research. This consortium bundles the expertise of around 50 research institutions and business partners for the development and application of UV LEDs, whereby TZW concentrates especially on the investigation of the effectiveness of different wavelengths and the microbiological and technical characterisation of UV LED disinfection modules.

Although third party validation according to a standardized test protocol is a crucial factor for market entry of LED disinfection devices, no internationally accepted standards have been established yet. For that reason, TZW initiated the development of a technical standard under the DVGW/DIN cooperation; the standardisation process will begin end of 2019. To support the standardisation work and prepare for upcoming validations, TZW is amidst the construction of a new test rig for LED systems and expanding appropriate laboratory capacities for optical measurements.

Standardisation

Two years after a first successful 'International Conference on UV LED Technologies & Applications' the planning for a second conference on UV LEDs and their multiple applications has started. TZW acts as program Co-chair and therefore will push forward this new technology and the safe use of UVC LEDs for drinking water disinfection. ICULTA 2020 will be held from April 26 to 29, 2020 in Berlin, Germany https://www.iculta.com/. The conference is jointly organized by the German consortium Advanced UV for Life and the International Ultraviolet Association (IUVA).

Optical measurement

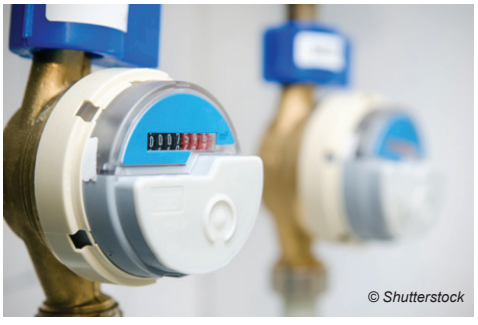
ICULTA 2020 INTERNATIONAL CONFERENCE ON UV LED TECHNOLOGIES & APPLICATIONS April 26-29 | Berlin, Germany

Jutta Eggers, Karl-Heinz Schön, Test Centre

Metrology for Real-World Domestic Water Metering (MetroWaMet)

The EU-Project "MetroWaMet" aims at establishing a metrological infrastructure which will enable an integral characterisation of domestic water meter performance close to real-world conditions.

Current test regimes for domestic water meters are prescribed to be run with well-defined, constant and reproducible reference flow rates. However, actual water consumption deviates strongly from these stationary conditions. This might have an impact on the cumulative uncertainty of meters that is not seen in the present standard continuous test regime. So far there is no clear view on how the various types of domestic water meters actually perform under dynamic load changes as the metrological capabilities for this are missing at present. Furthermore, during the last decades the state of the art of water meters (materials, fabrications, technologies) have progressed and consumer behaviour and technical equipment has changed significantly.



Water meter

In this project the required metrological infrastructure will be developed. Targeted conditions comprise dynamic load changes, water quality related aspects, and withdrawal of low amounts of water. TZW is mainly involved in experiments focusing on the impact of water quality on water meter performance and the identification and detection of low flows and leakage.

Leakage detection

The project is funded by the European Commission under the umbrella of the EMPIR Initiative (co-funded by the EU HORIZON 2020 program and the EMPIR Member States) and started in June 2018 with a duration of 36 months until May 2021.

Dynamic load changes

News and Updates of the project will be given under the project homepage:
www.ptb.de/empir2018/metrowamet/the-project/

Tobias Martin, Distribution Networks

EU project „Water Test Network“

“Water Test Network” a project funded within the Interreg North-West Europe-programme will run until the end of 2021. TZW is included as German partner, offering one of the demo-sites for testing products for the water sector. The project aims to help and support small and medium entreprises (SMEs) to bring innovative products to market.

"Water Test Network" will establish a trans-national network of testing facilities, which can be used by SMEs in North West Europe to develop, test and verify new products for the water sector.

Over the project lifetime (2018 - 2021) the Water Test Network aims to support at least 120 SMEs, to test 90 new technologies and to bring 30 of these new technologies to market.

A total of 12 partners from Belgium, the UK, Germany, the Netherlands and France are included in this network. TZW is the German partner within this network.

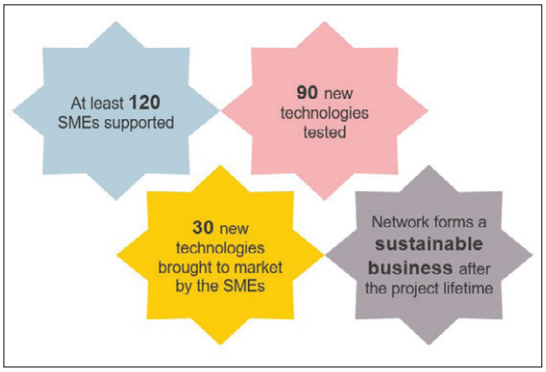
A first national event in Germany was organised in February 2019 at TZW in Karlsruhe. It was announced in different SME-networks and was very successful. At that information event, the participants were informed on how the funding can be applied for. So far, 10 German SMEs asked for support and applied for stage 1. All of them were accepted for stage 1 and are working for stage 2 approval now. Those accepted for stage 2 will receive the innovation vouchers of up to 25.000 €.

Innovation voucher

These vouchers will be tailored to the needs of the SMEs to guarantee a certain level of fully-funded support for the SME. SMEs are supported throughout the application process by an innovation chaser from the local project partner.

The voucher system will allow to allocate the SME to the most appropriate test facility.

Beate Hambsch,
Microbiology and Molecular Biology



Milestones

TZW mapped as Water Europe Living Lab

TZW was identified as the Water Living Lab in Germany because it develops new planning tools, integrated water supply and wastewater concepts together with experts from various disciplines.

Water Europe, formerly known as WSSTP, published its first Atlas of the EU water oriented living labs in July 2019. Water-oriented Living Labs (WoLLs) are defined as: “real-life, water oriented and demo-type and platform-type environments with a cross-sector nexus approach, which have the involvement and commitment of multi-stakeholders (including water authorities) and a certain continuity, and provide a “field lab” to develop, test, and validate a combination of solutions as defined in the SIRA, which include technologies, their integration as well as combination with new business models and innovative policies based on the value of water.” In the assessment process different characteristic were considered. Main pillars were: strategic and network value, market position, technological developments and offered services. After a stepwise selection process in total 105 water oriented living labs were identified and listed in Water Europe’s WoLLs atlas. Whereas, the majority of Water-oriented Living Labs are located in Denmark, France, Italy, Netherlands, Spain, and UK, TZW as German Water Centre was one of the spares mapped living labs in Germany. TZW was selected because of its project portfolio in the different fields of the water sector, the stability, the service offering and the market position. With a maturity level of 2.5 out of max 4 TZW is recognized as entity which works in close cooperation with full scale users, develops new ideas and has sound methods for extended testing and validation. Collaborating with Water Europe as WoLLS of the German water utilities means more visibility of the whole sector.

Selection process

Public consultation

Josef Klinger, CEO

Strengthening digital communication

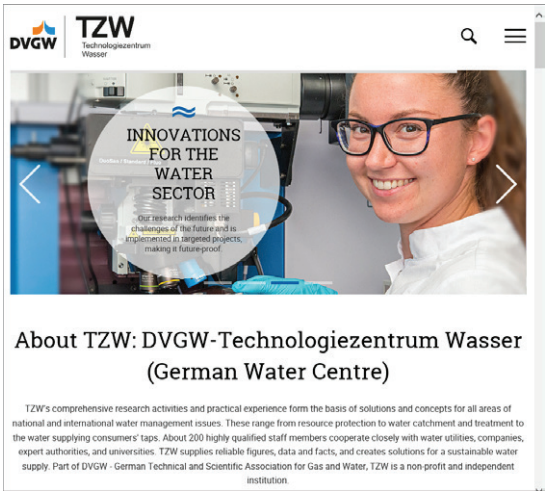
Digital media have long been part of our everyday lives, whether in the office, in the laboratory or privately. TZW has therefore decided to intensify online communication in dialogue with its customers and partners.

For many years our international customers and partners have appreciated the regular information provided by the four-page newsletter "TZW news". It reports briefly and concisely on current research projects with international partners and from the international network of water experts. Starting in 2020, TZW will make this information available as a digital, individual e-mail newsletter. TZW is thus switching to a tailor-made, resource-saving and fast form of communication. All customers and partners who receive the printed newsletter and whose e-mail address we have will receive the first digital edition of the TZW newsletter as a test version and can then subscribe to it.

In order to further expand online communication, TZW has fundamentally redesigned its Internet presence at www.tzw.de. A clear design of the pages increases the user-friendliness as well as the responsive web design, which ensures an optimal presentation on all end devices. The project database enables a precise search for research projects. Among the various innovations, the fresh look is the first to catch the eye. Large and expressive images direct the focus to the employees and give a completely new insight into the laboratories and technical facilities of TZW. The website is also available in a complete English version. Just click by!

Dagmar Uhl, Public Relations

E-mail newsletter



New website is online

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