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Cleaning water with laser-drilled filters: SimConDrill project nominated for Green Award

Microplastics enter our wastewater and the environment on a daily basis. Yet wastewater treatment plants struggle to filter out enough of these tiny plastic particles. Fortunately, help is on hand in the form of the SimConDrill research project, which the German Federal Ministry of Education and Research (BMBF) has been funding since 2019. Combining the expertise of five partners from industry and research, the aim of the project is to jointly develop a filter featuring tiny, laser-drilled holes that can remove plastic particles as small as 10 micrometers from wastewater. This remarkable innovation has now been nominated for the prestigious Green Award. Until February 14, 2020, you can vote online at <https://greentechfestival.com/en/awards/> to support the project.

According to a study by the Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT, 333,000 metric tons of microplastics are released into the environment each year in Germany alone. Yet researchers are still very much in the early stages of their investigations into what effects this might have on people and the environment. Microplastics are a widespread problem, and filtering out these tiny particles efficiently is simply not something wastewater treatment plants are designed to do. Yet clean drinking water is clearly essential to our health and the environment.

Having identified this issue as a key concern, the SimConDrill partners are aiming to develop a durable filter module to separate microplastics from water. Equipped with laser-drilled holes, the filter will be designed to efficiently filter out particles as small as 10 micrometers, even in applications involving large quantities of water. Now the Greentech Festival jury has nominated the SimConDrill research project for the Green Award 2020. Much to the delight of everyone involved, the jury made the nomination on its own initiative, not in response to a submission by the consortium.

Greentech – honoring innovative green projects

The Green Awards will be presented at the Greentech Festival, which will take place in Berlin from June 19 to 21, 2020. On the first day of the festival, the jury will be honoring green technologies that help make the world more sustainable and create a better future. The man behind the festival is former Formula One world champion Nico Rosberg, who worked with engineers Sven Krüger and Marco Voigt to bring the event to life. The SimConDrill team has been nominated in the Innovation category. The award will go to the most impressive and promising innovations in the greentech sector.

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Clever combination of filter and cyclone separator

This new generation of filters is based on a cyclone filter from Klass-Filter GmbH. Large quantities of water are pushed through the filter at the center while the particles in the water are separated out.

The Fraunhofer Institute for Laser Technology ILT and the company LaserJob GmbH are working on the technology required to drill holes efficiently in the metal foils used in the cyclone filter. The most suitable systems for this job are high-power lasers that emit ultra-short pulses in the picosecond and femtosecond ranges. To produce an efficient filter, the laser must drill large numbers of holes in the thin foils, ensuring that each hole is smaller than 10 micrometers. Challenging work!

To make the process more affordable, the scientists are also investigating the use of multi-beam processing with more than 100 parallel beams. Care must be taken with this method, however, since drilling 100 holes simultaneously may melt and distort the filter foil. The key here is to ensure carefully aligned process parameters and suitable processing strategies. To do this, the researchers are combining a process simulation developed at Fraunhofer ILT with optimization software from OptiY GmbH. To guarantee the quality of the laser drilling process, they are also using a measuring system developed in collaboration with Lunovu GmbH. This system will ensure that all the holes are drilled correctly and that water flows through the filter at a normal rate.

The research project is set to run until June 2021. Currently, the team can drill holes with a diameter of 10 micrometers in metal foils that are 200 micrometers thick. The next step is to scale up the process for industrial use. The researchers have already succeeded in integrating some of the drilled test foils in the cyclone filter and begun functional and flow testing.

Sustainability across the board

Although the filter module is being developed and tested for wastewater treatment plants, it could also conceivably be adapted for mobile use in sewer cleaning vehicles or for private households. The filter also offers significant potential for cleaning ballast water. The SimConDrill filter is designed to be durable rather than disposable, with a rotor in place to prevent it getting blocked. The microplastics filtered out of the water can be collected from the cyclone filter and then recycled.

Green Award

The Green Award nominations committee has selected six nominees in each category (Youngster, Innovation, Start-up and Impact). One finalist in each category will be selected by online voting, with two more selected by the jury itself. The winner of each

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category will then be chosen from the three finalists. Votes can be submitted online from January 14 to February 14, 2020. More information on the prestigious Green Award is available on the following website: <https://greentechfestival.com/awards/>

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The SimConDrill project is funded by the German Federal Ministry of Education and Research (BMBF). It is part of the BMBF's SME innovation funding initiative for resource efficiency and climate protection (technology and application area "sustainable water management").

Further information about SimConDrill: www.simcondrill.com

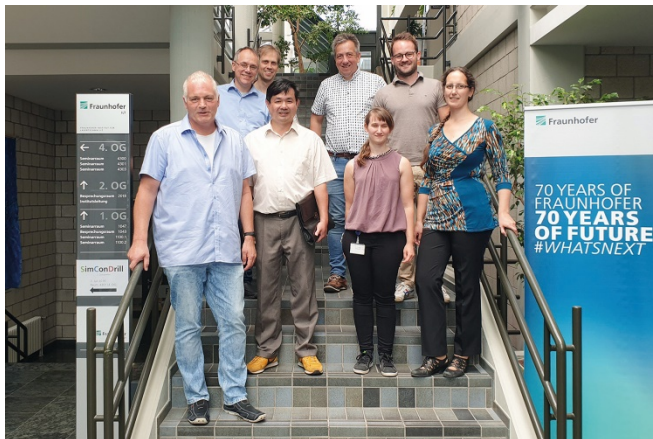


Image 1:
The SimConDrill consortium gathered at Fraunhofer ILT in Aachen in July 2019 to discuss the current project status.
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Image 2:
The aim of the SimConDrill project is to build a cyclone filter that can efficiently remove tiny plastic particles from large quantities of water.
© KLASS-Filter GmbH, Türkenfeld, Germany.

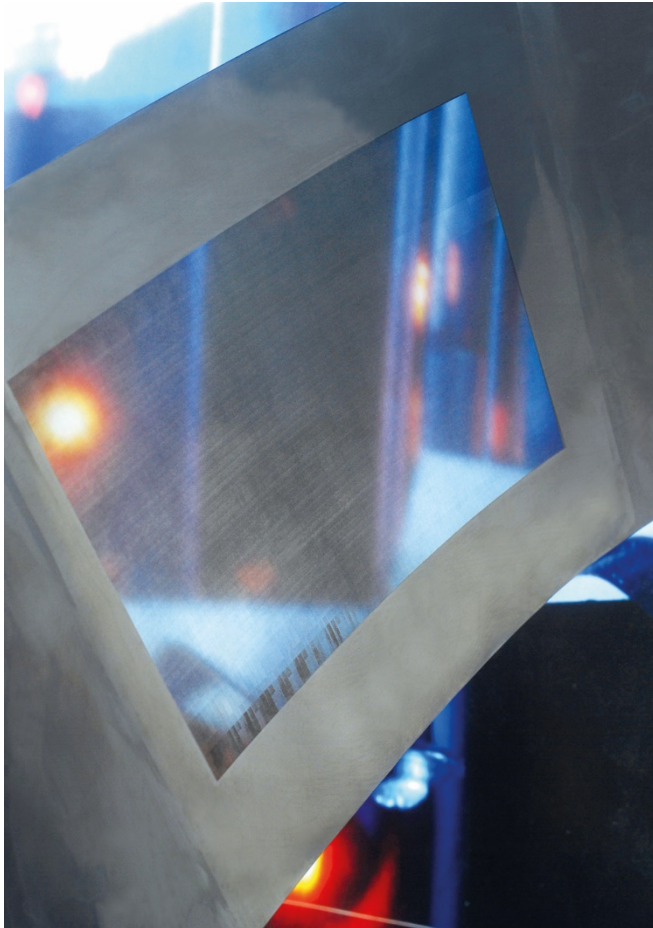


Image 3:
Just 200 micrometers thick, these metal foils feature laser-drilled holes with a diameter of just 10 micrometers. The foils are a key component of the SimConDrill cyclone filter.
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