

As part of a research study funded by ESA

With “Plasma Pure Water”, terrapiasma is developing a demonstrator for water treatment with Cold Plasma on an industrial scale

Garching near Munich, 19. September 2024 - A few months ago, the Cold Plasma pioneers at terrapiasma GmbH were able to show that with their highly effective technology it is possible to reduce the so-called “forever chemicals” (PFAS Per- and polyFluorinated Alkyl Substances) in drinking water. As part of a research study funded by ESA Spark Funding (<https://www.esa-technology-broker.it/spark-funding/>), the company wants to expand its research and develop a water treatment system with a significantly more powerful flow rate. Under the project name “Plasma Pure Water”, terrapiasma aims to complete a larger demonstration system that will meet the requirements of large households and smaller industrial applications with at least 100 liters per minute. A first prototype named “tpWater” is already being tested and optimized.

**Clean drinking water is becoming an increasingly scarce commodity – even in industrialized countries**

Water is the basis for life – and we are using more and more of it. In addition to its use in agriculture and production, drinking water plays a central role worldwide. According to United Nations estimates, over 1.6 billion people lack access to clean drinking water, leading to over half a million deaths from childhood diarrhea each year. The Environmental Performance Index (EPI) from Yale and Columbia Universities provides a well-founded assessment of how much the qualities of the environment vary. According to the EPI, countries can achieve a maximum value of 100 in the drinking water category. There are seven European countries in the top ten for drinking water quality with a value of 100: Austria is in first place, closely followed by Finland, Greece, Iceland, Ireland, Malta and the Netherlands. With a score of 98.60, Germany only made it to eleventh place. Eight other European countries have good water quality with a value of over 90 according to the EPI.

**PFAS detected in drinking water in more and more communities**

Germany is one of the countries with the cleanest drinking water in the world, but here almost 30% of the drinking water comes from surface water, which by law must be filtered and treated before consumption. In addition to microbiological contamination, chemical pollution is also a problem even in developed countries. Across the EU, 23% of groundwater and 58% of surface water are polluted and cannot be used as drinking water without cleanup. The latest topic in this context is PFAS, non-biodegradable dangerous chemicals that have already been detected in the groundwater of over 1,500 communities in Germany alone and will exceed the upcoming limit values in 2026.

**Advances in Cold Plasma technology support drinking water treatment**

The developers of terrapiasma were able to show at the beginning of the year that their water treatment technology can also treat critical substances. The team has long been involved in the research and development of Cold Plasma solutions in water. With a DLR-supported program aimed at chemical-free disinfection of food with plasma-activated water (PAW), or “Happy Teeth” (supported by ESA), which uses PAW as a replacement for conventional mouthwash, terrapiasma shows that it has the best prerequisites for tackling the challenges of drinking water treatment in a technologically effective way. PAW is highly bactericidal and virucidal and at the same time meets WHO recommendations for drinking water. In initial tests with the “Happy Teeth” prototype, which was not optimized for this purpose, terrapiasma was able to reduce PFAS by up to 20%, thus demonstrating the ability of PAW to successfully decontaminate even persistent pollutants with minimal energy consumption (<0.008 kWh/m<sup>3</sup> water).



terrapiasma

replacing chemicals. the sustainable way.

## Setting standards in water treatment with greater throughput

The current challenge for terrapiasma is now to scale a water treatment device from a household unit with a volume of 0.5 liters ("Happy Teeth" prototype) to an industrial-scale system with a flow rate of around 100 l/min. This presents significant technical and operational challenges. Adapting components, maintaining effectiveness and optimizing Cold Plasma technology requires careful consideration and testing. Achieving consistent, efficient and reliable treatment of larger volumes of water is crucial for successful implementation in industrial environments. The terrapiasma team is confident of achieving this scale and developing "Plasma Pure Water", a water treatment demonstrator for the market on an industrial scale.

### About terrapiasma

Founded in 2011 as a spin-off of the Max Planck Society, terrapiasma GmbH, based in Garching near Munich, offers innovative solutions and technologies for the development of cold plasma products in areas where bacteria, fungi, viruses, spores, allergens and odor molecules efficiently and must be permanently inactivated or harmful molecules cause problems. Cold Plasmas are partially ionized gases that, thanks to their high effectiveness, can replace conventional chemicals or other technologies such as UV, heat or radiation in an increasing number of applications.

With its proven basic technologies, the Cold Plasma pioneers at terrapiasma work with well-known companies in the areas of medical technology, hygiene, water treatment, odor management, air purification, cosmetics, surface modification and much more. It is terrapiasma's goal to further develop and market its environmentally friendly Cold Plasma solutions in line with needs together with these partners from the industry. A young team that works with a lot of creativity and sophistication, extensive know-how in the areas of Cold Plasma research and technology as well as over 60 patents worldwide support the GreenTech company on its path to success.

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Press photo – Drinking water treatment with Cold Plasma with "tpWater" by terrapiasma



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