EVODROP

WILL of WATER

EVOpool

Clean Nano-Colloid electrolysis™

A revolution in pool water treatment without chlorine, bromine or salt

we are water

SWISS TECHNOLOGY FOR HEALTHY POOL WATER TREATMENT

Toxic disinfectants and algaecides can be avoided and the use of pH regulators can be minimized. The EVOpool water treatment processes are based on the killing effect of silver and copper particles on bacteria, algae and viruses. The silver and copper nanoparticles also aggregate with various organic and inorganic particles, making them filterable. Flocculants are therefore no longer required.

The automation of the EVOpool system offers significant time advantages. The daily use and checking of chemicals is no longer necessary. Instead, only weekly rapid water tests with the color scale of the copper indicator are necessary. The use of oxidizing agents is only necessary sporadically for the removal of skin flakes and hair.

In addition, the system enables financial savings from the first day of use, as the majority of conventional chemical usage is eliminated. Occasional replacement of the electrodes is dependent on water consumption.

Thanks to the EVOpool system, you can use your swimming pool without the conventional, disturbing side effects caused by the use of chlorine or bromine, such as eye irritation, respiratory problems, dehydration of the skin and impairment of the natural hair structure as well as discoloration of the hair.

The Clean Nano-Colloid electrolysis™ is a multi-patented solution developed by Swiss engineers for a clean electrolysis process.
Pool without eye irritation, dehydration of the skin or chlorine in the respiratory tract.

A PATENTED WORLD FIRST

Developed by Swiss engineers and researchers, Evodrop's Clean Nano-Colloid electrolysis™ defines the state of the art in swimming pool water treatment. The technology, which is protected by several patents, guarantees maximum hygiene protection without the use of chlorine, bromine, salt or expensive filtration systems.

Benefits

+ Proven no negative Effects of reprocessing on the human body as with chlorine or bromine

+ Cost-effective maintenance contains only the Replacing the electrodes depending on Water consumtion

+ No environmental impact from VOC or toxic by-products

+ For maintenance only sporadic rapid tests of the Color scale indicators required

+ Toxic disinfectants and Algicides can be avoided and the use of pH regulators be minimized

+ No use of flocculants more needed

+ Long service life thanks to of a cavitation-proof Functional principle

+ Effectiveness and efficiency scientifically tested and verified

+ 5-year guarantee on material and Processing

Healthy and harmless to humans and plants

No chlorine, bromine or salt

Water-saving operation

No environmental pollution from chemicals

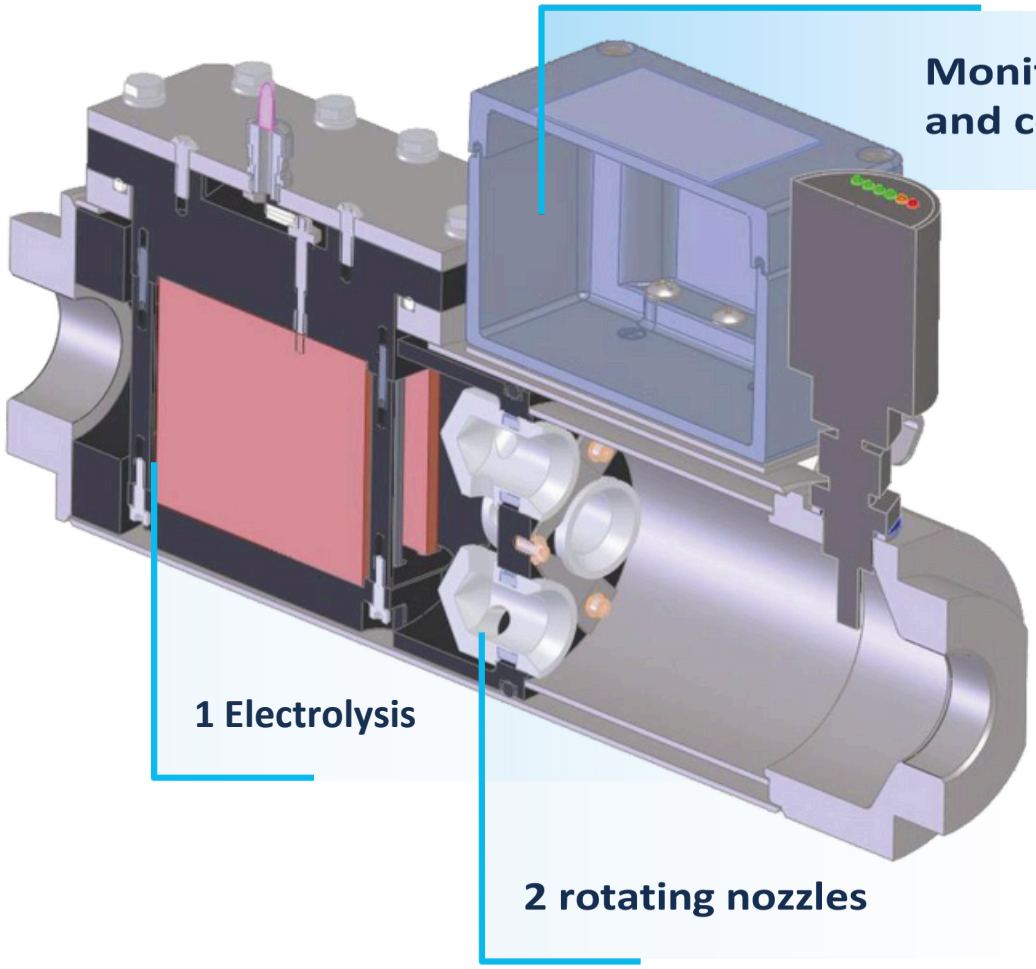
Easy to operate

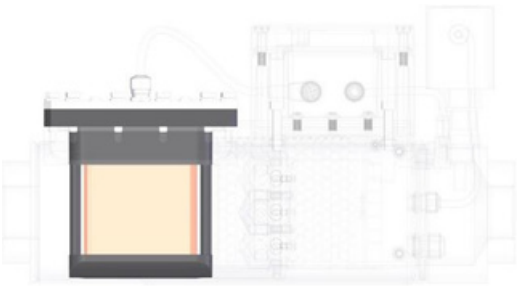
Inexpensive and easy maintenance

SWISS MADE

100% Swiss Made with a passion for engineering and high-quality materials

Evodrop systems are developed and manufactured in Switzerland using patented technologies and the highest quality raw materials. We stand for this quality with "Swiss Made".

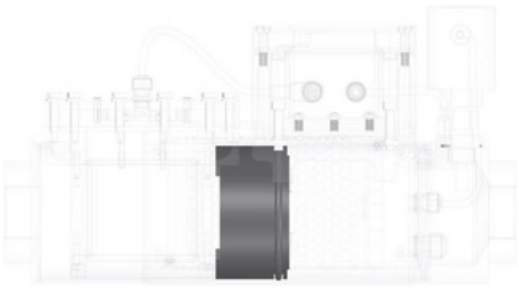




Step 1 - ELECTROLYSIS

Thanks to the unique and patented Clean Nano-Colloid electrolysis™, colloidal silver and copper particles are generated in the water. These nanoparticles react with germs and algae and render them harmless.

Silver reacts with germs in a variety of ways. As silver particles, it binds to the sulphur-containing amino acids in enzymes and cell structures and thus prevents germs from surviving. Silver nanoparticles destroy important vital functions in protozoa and thus disinfect the water. According to federal law, silver is also permitted in drinking water to prevent contamination. In the case of copper, the reactions on and in the germs are somewhat more complex. The colloidal copper particles are the most effective, especially during photosynthesis. This is why algae react most sensitively to copper. Reactive copper is formed on the copper nanoparticles, which leads to the formation of so-called reactive oxygen, which is very effective in inactivating germs. The free copper concentration in the bath water should be checked sporadically. The concentration is usually well below the copper drinking water limit of 1 mg per liter.



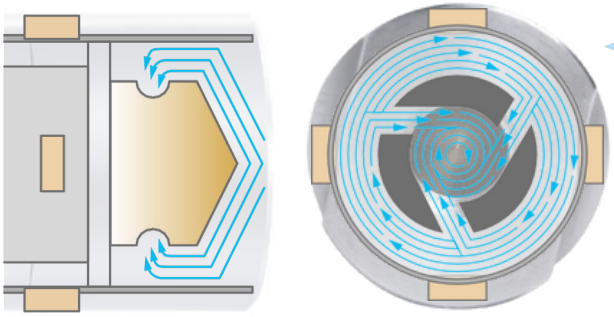
STEP 2 - ROTATING NOZZLES

In this step, the water is rotated extremely quickly by patented rotating nozzles. This process is important for separating the germs and thus for their final elimination.

Germs such as bacteria, viruses and algae usually appear in the water as small clumps. These clumps protect the germs inside from silver and copper and thus guarantee their survival.

The high gravitational forces after passing through the rotating nozzles break up the clumps, thereby separating the germs and making them susceptible to disinfection by silver and copper. Silver and copper nanoparticles agglomerate easily. This makes their surface area, which is presented to the water, smaller and fewer ions are released. The rotating nozzles also break these aggregates into their individual parts and thus increase the reactive surface area.

The strong rotational force also succeeds in reducing the so-called water clusters. The hydrogen-oxygen ratio is thus optimized, resulting in H3O2. This effect occurs in nature as the water makes its way through kilometers of streams.

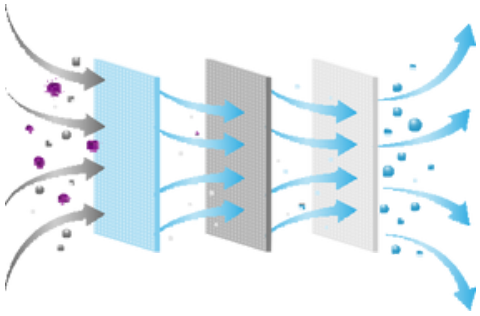


The resulting water coherence due to the strong physical effect on the water leads to an increase in the efficiency of the colloids, as they can now bind more strongly in the water. This promotes a high depot effect of the colloids in the water.

Scientifically tested and repeatedly proven

With the help of the LifeVisionLab in Zurich (Dr. Zina Palic), the Water Research Foundation (Dr. Everine van de Kraats), Institut Dartsch Scientific GmbH (Prof. Dr. Peter Dartsch) and of the Scientific Research Center of Medical Biophysics (Prof. Dr. Ignat Ignatov), we were able to provide the following evidence, among others.

– Stable coherent structure (H3O2)
– Faster hydration of the cells
– Boosts metabolic functions
– Anti-inflammatory effect
– Improvement of cell regeneration
– Reduction of cell degeneration
– Excess electrons in water



STEP 3 - FLOCCULATION AND FILTRATION

In the final step, the germs flocculate without any further chemicals and are simply removed by the existing filter system of the swimming pool technology.

In traditional bath water treatment, flocculation of the smallest suspended particles, such as parts of the destroyed germs, is triggered by the addition of mineral salts. This is not necessary with the EVOpool process. The

Nanoparticles and cell components agglomerate spontaneously and can therefore be removed using the existing filtration system. This eliminates the annoying pH regulation and the salt content of the water does not increase either.

What happens to the Evodrop particles when the water evaporates?
When the water evaporates from our particles, the nanometer-sized silver and copper particles form a thin film of pure metallic silver-
and copper particles on the surface that was wetted before vaporization. Metallic silver and copper particles in the form of a thin film preserve the antibacterial properties of the silver/copper and thus protect the surface from bacterial growth. This is very important for disinfection applications where the antibacterial properties of the thin silver/copper film, which remains on the surface after the water has evaporated, continue to provide protection against bacterial growth. In contrast, the silver/copper oxide that is released during evaporation of ionic silver/copper only provides very little protection. - Ionic silver/copper

Since a true silver/copper colloid consists of silver/copper nanoparticles and not silver/copper particles, ionic silver/copper quickly combines with chloride in the human body to form an insoluble compound called silver/copper chloride, which is far less reactive than metallic silver/copper nanoparticles. In fact, ionic silver/copper cannot survive in the human body. In the digestive tract, hydrochloric acid provides the chloride ions that cause ionic silver/copper to rapidly convert to silver/copper chloride. Should ionic silver/copper ever enter the bloodstream, it would find a large supply of chloride ions there, as the blood serum is rich in sodium and potassium chloride, which in turn quickly forms silver/copper chloride. Only silver/copper nanoparticles can survive in the body.

Ionic silver/copper is not the same as metallic silver/copper nanoparticles. Metallic silver/copper, for example, is not soluble in water (does not dissolve in water), but ionic silver/copper is water-soluble (it dissolves in water). Technically speaking, a silver/copper particle is a silver/copper atom that is missing an electron. It is the outermost electrons of an atom that determine the physical properties of matter. If you take an electron away from a silver/copper atom, you get a silver/copper particle,
which is soluble in water. In its ionic form, silver/copper is very reactive with other elements, which means that it easily combines to form compounds. Ingesting highly concentrated forms of ionic silver/copper (with a silver/copper concentration of 100 ppm or more) can potentially cause a condition known as argyria, a permanent discoloration of the skin.

Is the EVOpool technology environmentally friendly?
Evodrop colloidal particles are by no means a radical environmental burden or cytotoxic to the human organism. Plant cultures with such particles grow more vigorously and massively. Animals such as fish or concentrated feed cattle are significantly supported in their health against parasites/viruses with such particles as a natural supplement/anti-biotic/medicine. The earth itself produces this form of particles for the natural cycle in a complex mechanism.

Why colloidal?
Colloidal particles are the smallest particles into which matter can be divided while retaining its individual properties, without becoming atomic, becoming an ion and being enclosed in an inactive sulphate, oxide, chloride or fluoride molecule. These are nanoparticles that are in constant suspension because the electrical charge, the zeta potential, on each particle is a mutual repulsion and prevents aggregation into large, ineffective particles.

UNIQUE FUNCTIONALITY

The colloidal nanoparticles produced by the Clean Nano-Colloid electrolysis™ released by Evodrop consist of a distribution of silver and copper nanoparticles in a solution. These nanoparticles are very small, with a size of only a few nanometers. When they are mixed with water, they form a suspension of nanoparticles in the solution. These particles remain stable due to their surface tension and interactions with water molecules. The colloidal solutions of Evodrop form stable water clusters around the colloidal particles. The stable water clusters with Evodrop colloidal effects on the water molecules are essential for structuring water to increase electromagnetic hydrogen bonding in water for practical applications.

Type of bonds in Evodrop colloidal nanosilver and nanocopper:

Scientific data shows that there are solutions of colloidal nanosilver with ionic interactions. The interactions depend on the technology used to produce the colloidal solutions. The nanoparticles produced by Evodrop's Clean Nano-Colloid elec-trolysis™ do not form ionic bonds with water. Instead, the nanoparticles are distributed evenly in the solution as a suspension thanks to physico-chemical forces such as surface tension and electrostatic interactions.

Due to these properties, Evodrop colloidal nanosilver and nanocopper do NOT accumulate on swimming pool walls.

The non-toxic effect of Evodrop nanosilver and nanocopper was investigated at the Bulgarian Academy of Sciences (BAS), Institute for Biodiversity and Ecosystem Research, Bulgaria.

The studies with Assoc. Prof. Teodora Todorova, conducted at the Bulgarian Academy of Sciences with yeast, show that Evodrop colloidal nanosilver and nanocopper are non-toxic and non-toxic.
are carcinogenic. Various sources have published evidence of the anti-cancer effect (Zhang et al., 2016), the inhibition of bacteria, fungi (Popova et al., 2021) and the SARS-CoV virus (Jeremiach et al., 2022) of colloidal nanosilver.

In the cell survival and Ty1 transposition assays, a single treatment with colloidal nanosilver did not show a statistically significant reduction in cell survival rate (Fig. 1). However, when colloidal silver was combined with the positive control MMS, this led to an approximately threefold higher survival rate than after a single treatment with the positive control alone. Methyl methane sulfonate (MMS) is a listed genotoxic carcinogen. These results indicate that treatment with colloidal nanosilver has no cytotoxic effects and exhibits pronounced anticytotoxic activity (Fig. 1).

(Fig. 2). In contrast, when colloidal silver was combined with MMS, a significant reduction in the MMS-induced Ty1 transposition rates were observed to be 2.5-fold higher. This indicates a possible anti-cancer effect when the two treatments are combined.

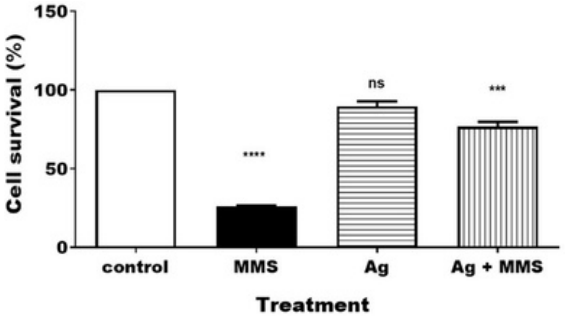


Fig. 1: Here, the cytocidal character of the MMS could be completely minimized thanks to the special Evodrop nanosilver. Conclusion: Evodrop nanosilver significantly supports cell activity.

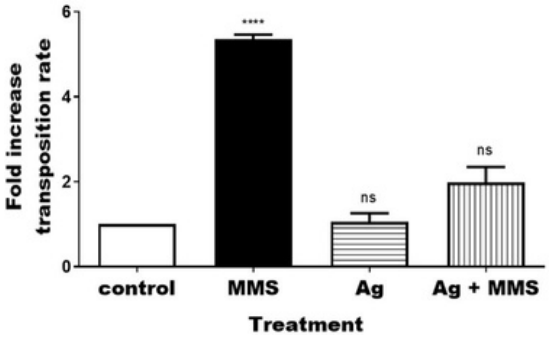


Fig. 2: Here it could be verified that Evodrop nanosilver can significantly reduce the carcinogenic properties of MMS. Conclusion: Evodrop nanosilver has demonstrable anticarcinogenic effects.

Peer-reviewed and scientific publications from Evodrop

1. Valcheva, N., Ignatov, I., Huether, F. (2020). Microbiological Research of the Effects of Evodrop Silver Nanoparticle on Escherichia coli, Enterococci and Coliforms. Journal of Advances in Microbiology, Vol. 20, No.11, pp. 22-31. https:// journaljamb.com/index.php/JAMB/article/view/468

2. Ignatov, I., Valcheva, N., Huether, F. (2020). Nano and Microbiological Effects of Evodrop Silver and Copper Nanoparticle. Journal of Materials Science Research and Reviews, Vol. 6, No. 4, pp. 63-71. https://journaljmsrr.com/index. php/JMSRR/article/view/106

3. Huether, F., Ignatov, I., Valcheva, N., Gluhchev, G. (2020) Applications of Evodrop Water as Drinking Water of Highest Quality. Antibacterial and Anti- viral Effects of EVOhygiene Colloidal Silver and Cooper Nano Water, European Journal of Molecular Biotechnology, Vol. 8, No 1, pp. 14-23. 4. Popova, T., Ignatov, I., Huether, F., Petrova, T. (2021) Antimicrobial Activity of Colloidal Nano- silver 24 ppm in vitro, Bulgarian Chemical Communications, Vol. 53, No. pp. 365-370. http://www.bcc.bas.bg/bcc_volumes/Volume_53_Number_3_2021/ bcc-53-3-365-370-ignatov-5404.pdf5. Popova, T.P., Ignatov, I., Petrova, T.E., Kaleva, M.D., Huether, F., Karadzhov, S.D. (2022) Antimicrobial Activity In Vitro of Cream from Plant Extracts and Nanosilver, and Clinical Research In Vivo on Veterinary Clinical Cases, Cosmetics, Vol. 9, 122. https://www.mdpi.com/2079- 9284/9/6/12

TESTED AND CERTIFIED

SRCMB (Scientific Research Center of Medical Biophysics) of Dr. Prof. Ignatov.

A comprehensive study has confirmed that Evodrop maximizes the conductivity and solubility of water.

Dartsch Scientific is a renowned institute for cell biology in Germany.

It has been proven that the water stimulates the basal cell metabolism after treatment, thus increasing cell penetration and activity by up to 20 %.

One of the largest institutes for guaranteeing the quality and safety of products.

Stable and particulate nanoparticles were detected using electron microscopy in an accredited Swiss laboratory.

Laboratory for analysis with a state-of-the-art scanning electron microscope (SEM / EDX)

Further verification with accurate and well-founded measurement methods such as SEM and EDX to determine the nanoparticle properties.

ISO 9001 is the world's most popular management system for quality management.

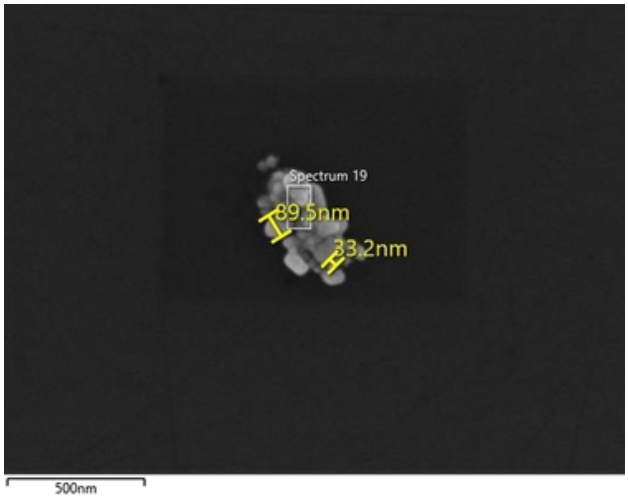
Evodrop meets and implements the optimization of customer requirements in its processes in the best possible way. This has been certified in accordance with the ISO 9001 standard.

All connections are standardized in accordance with DVGW specifications and ensure that the quality and safety correspond to the current state of the art.

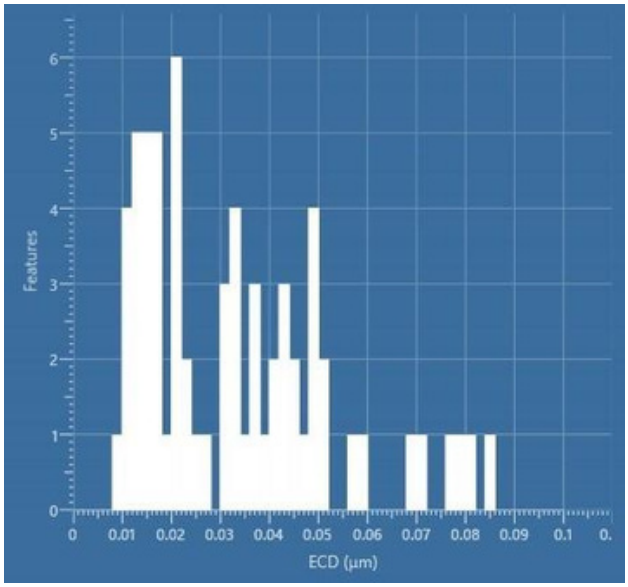
DETERMINATION OF PARTICLE SIZES

According to Particle Vison (CH), the EVOpool system produces nanoparticles in the order of 5-30 nanometers. These are very effective against bacteria and viruses. For particles larger than 50 nanometers, the reactivity and thus the effectiveness against bacteria and viruses decreases significantly. Discoloration of the pool walls has never been observed due to the size of the EVOpool nanoparticles. An intelligent and patented control system for the ideal current supply to the electrode plates guarantees constant, optimum operation of the system. An integrated sensor monitors the system and indicates when a cartridge change is due.

The combination of silver and copper paired with the small size of the nanoparticles generated and a intelligent control system protects the hygiene of your bathing water extremely effectively and makes every dip in the pool a very special bathing experience.



Detailed image of a smaller agglomerate of silver nanoparticles (top) with the corresponding measurements of the individual nanoparticles that form the agglomerate (bottom). The individual nanoparticles are mostly < 100 nm.



Particle size distribution on the boron substrate of the sample nanoparticles 5 mg (see recorded particles in Figure 16). Y-axis (features) = number of particles, X-axis (ECD) = particle diameter in micrometers (µm). In this particle size analysis, it can be seen that the majority of the particles have a diameter ≤ 50 nm.

CHARACTERIZATION OF PARTICLES IN WATER BY SEM-EDX* AND TEM*

Figures 1 and 2 show a comparison of the water treated from the sample with and without the EVOpool. It is obvious that the sample with the water contains much more inorganic residues due to the EVOpool.

Spherical particles with different chemical compositions were observed on both filters, suggesting that a strong anti-bacterial effect was induced.

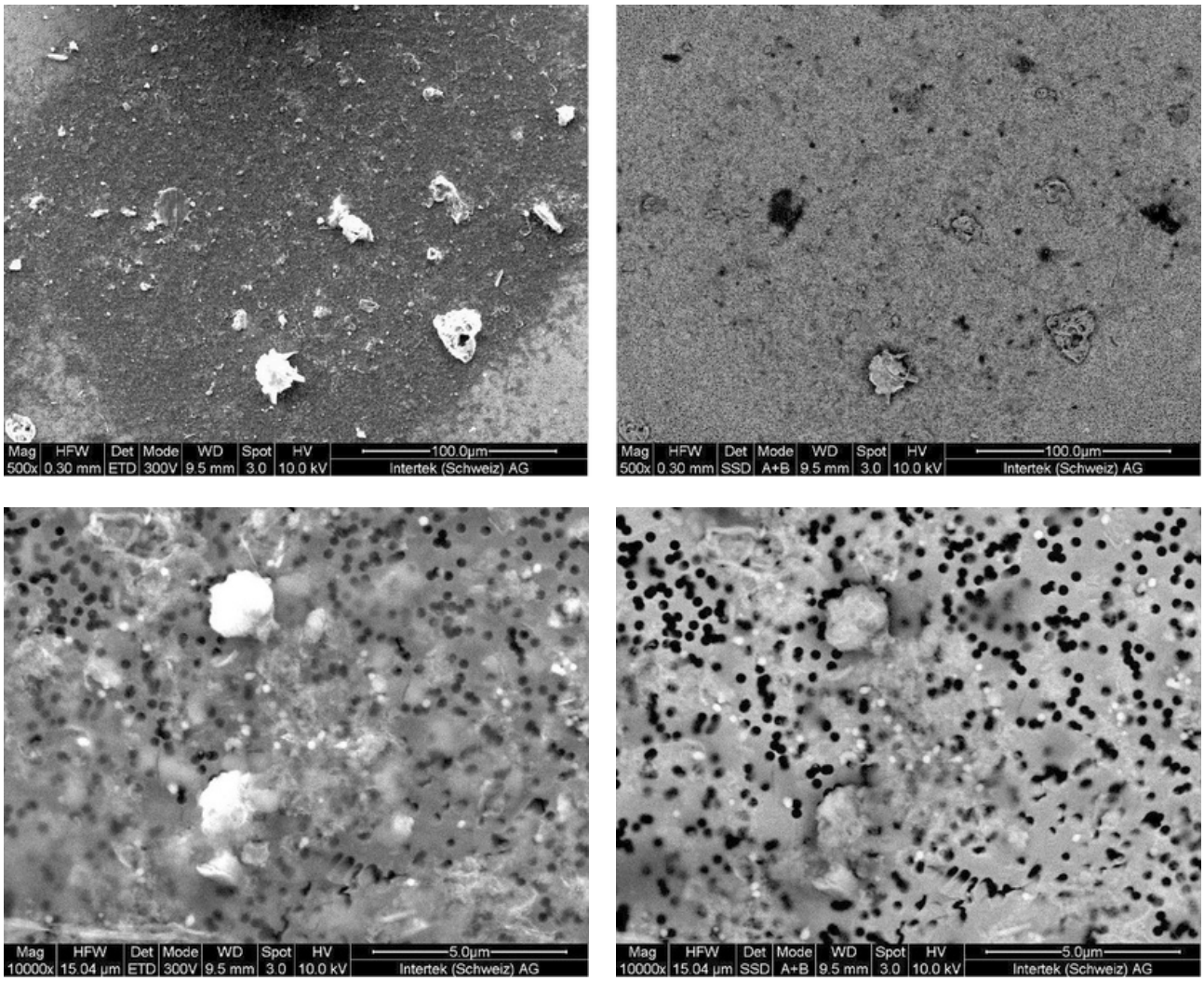


Fig. 1: Sampling without EVOpool at two different magnifications.

***SEM-EDX:** Scanning electron microscopy (SEM) with energy dispersive X-ray analysis (EDX) provides detailed, high-resolution images of the sample by scanning a focused electron beam across the surface and capturing secondary or backscattered electron signals.

***TEM:** Transmission electron microscopy (TEM, also stands for transmission electron microscope) is an operating mode for electron microscopes that enables direct imaging of objects using electron beams.

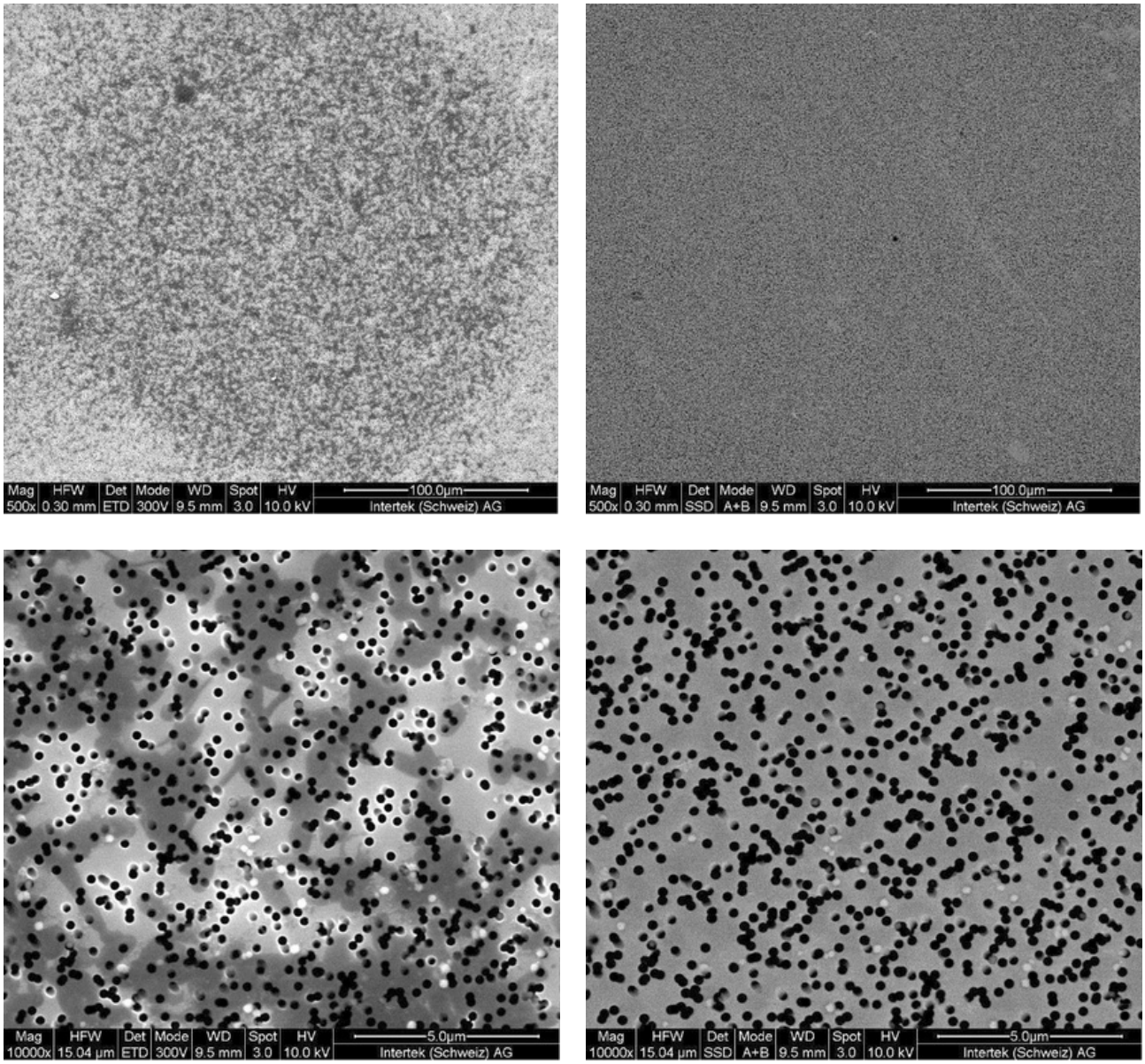


Fig. 1: Sampling with EVOpool at two different magnifications.

CONCLUSIONS:

The nanoparticles have been proven to be generated in the dimensions required for the effective and sustainable elimination of algae, bacteria and viruses.

In addition, the nanoparticles are by no means reactive ionic, but solid and particulate.

CYTOTOXIC ANALYSIS

The following water samples were provided by Evodrop AG in Zurich for the investigation of a possible cytotoxic effect:

Sample 1: Untreated tap water
Sample 2: EVOpool water OFF mode (electrodes switched off)
Sample 3: Chlorine
Sample 4: Bromine
Sample 5: EVOpool Maximum power
Sample 6: EVOpool standard dosing

Conclusion:

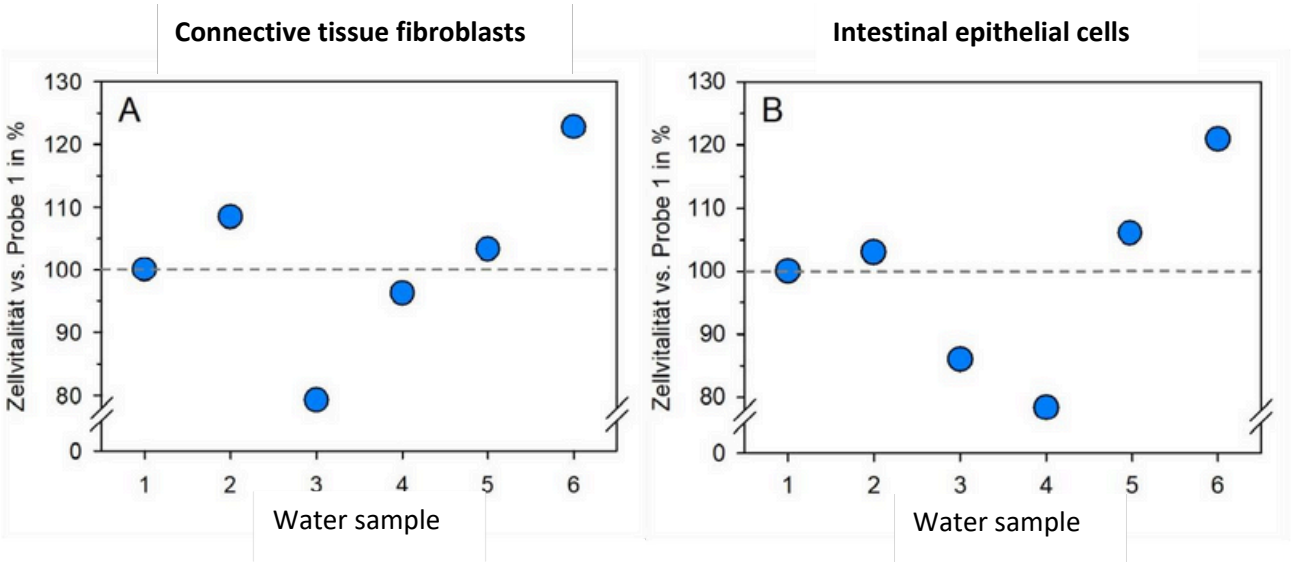
The nanoparticles of the EVOpool solution do not have a cytotoxic effect on intestinal epithelial cells and connective tissue fibroplasts at the cellular level and can even have a positive effect.

Compared to cytotoxic or cell-damaging chemicals/dosing agents such as bromine or chlorine, Evodrop technology does not harm the organism at all, but provides enzymatic support at the cellular level.

Morphological investigation (qualitative investigation)
No recognizable morphological changes in the cells were observed at all test concentrations. In accordance with the EN ISO 10993-5 guidelines, the test concentrations were classified as "reactivity grade 0".

Enzymatic test (quantitative test)
All test concentrations of the various water samples - even at the highest test concentration of 40% by volume - showed only slight deviations from the measured values for the untreated tap water (= sample 1), which served as a comparison. The maximum Reduction of one of the tested water samples (= sample 5) amounted to 15 %. Applying the guidelines of EN ISO 10993- 5 for biological compatibility, the following results were obtained

The maximum permitted reduction of 30 % is therefore not exceeded. However, as the intestinal epithelium, in contrast to connective tissue cells, comes into contact with the undiluted water sample immediately after ingestion, the generated sample water should only be ingested in diluted form. Further details can be found in the figure legend.

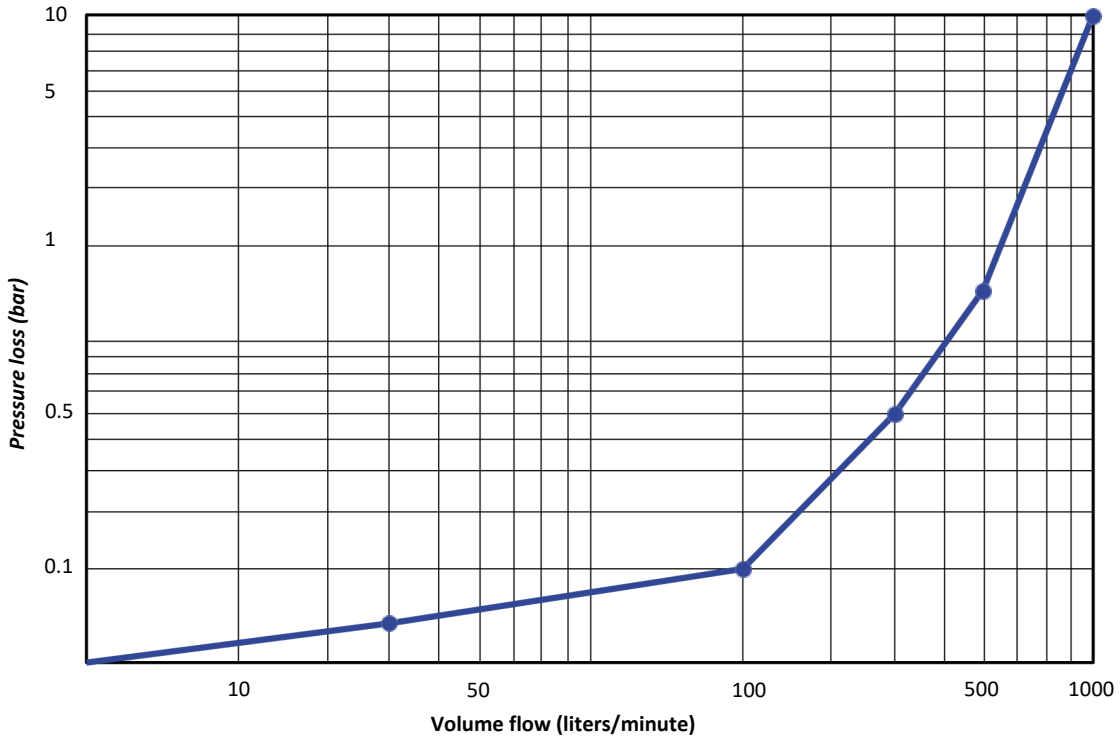


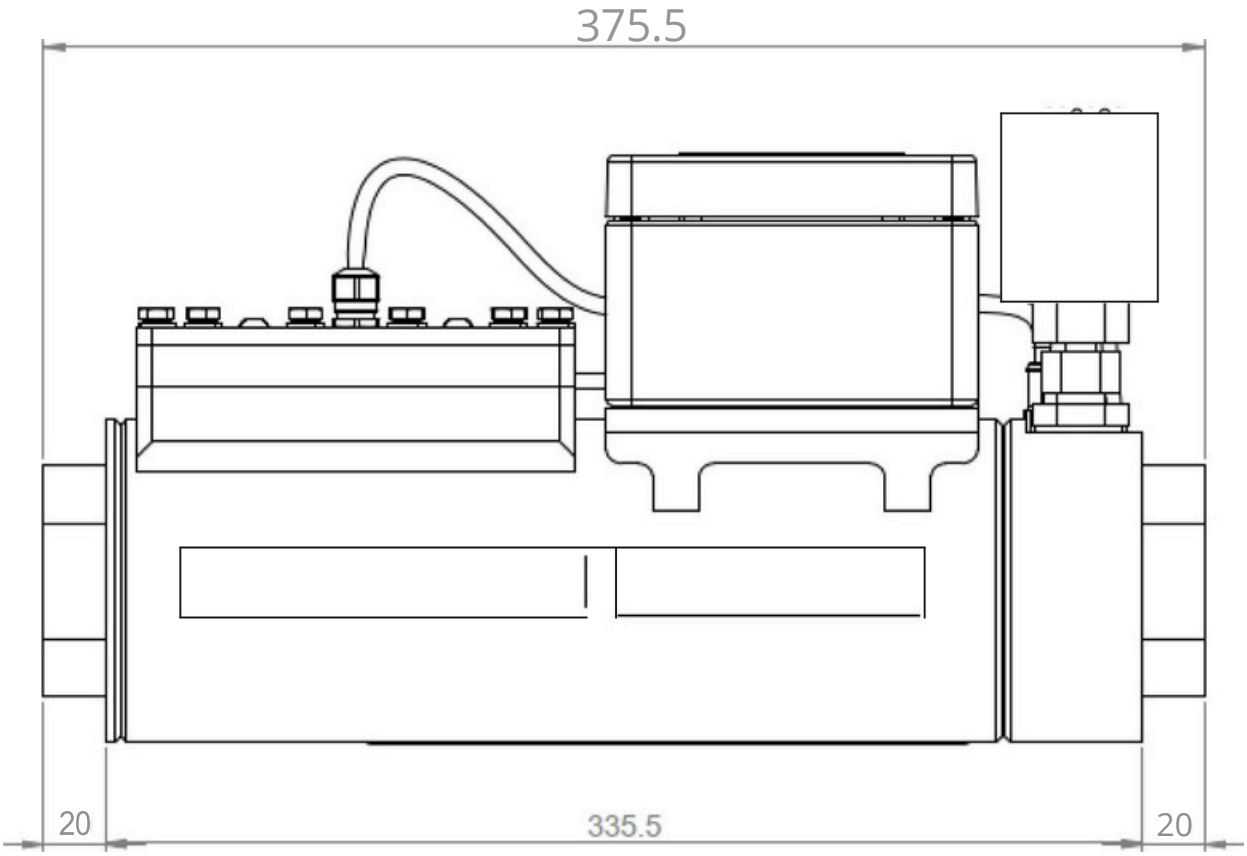
Graphical representation of the test results for the enzymatic test for connective tissue fibroblasts (A) and intestinal epithelial cells (B). The measuring points represent the relative values for each water sample compared to the untreated tap water (= sample 1; here always set equal to 100 % cell vitality). Only the results for the maximum tested concentration of 40 vol% (= dilution of 1:2.5) are shown. It is easy to see that water sample 6 showed clearly stimulating effects in both tests.

TECHNICAL DATA

Weight	14 kg without controls and sensors
Connections	5/4 inch female thread
Flow rate	from 20l/min
Operating pressure	For pressure conditions ≥ 4 bar, an appropriate pressure reducing valve must be used
Pressure surges	For pressure surges ≤12 bar, an appropriate pressure shock absorber must be used
Ambient conditions	0°C - 45°C
Materials Water-bearing parts	• V2A / 304ss • POM-C • NBR
Operating voltage	Low voltage: 48V at max. 1.5A
Protection class	IP65
Electrode package	• Fivefold electrode made of silver-copper alloy • Control connection cable • Cable length: according to result, 1.5m • Plug type: M12, male, type A
Water requirements for clean operation	• Water hardness: 150-400ppm • Temperature range 10°C - 40°C • 6-8 pH • Free chlorine max. 0.3 mg/l • Chloride ion concentration max. 50 mg/l (data sheet 830 stainless steel rosifrei in chloride-containing water)

EVOpool performance diagram

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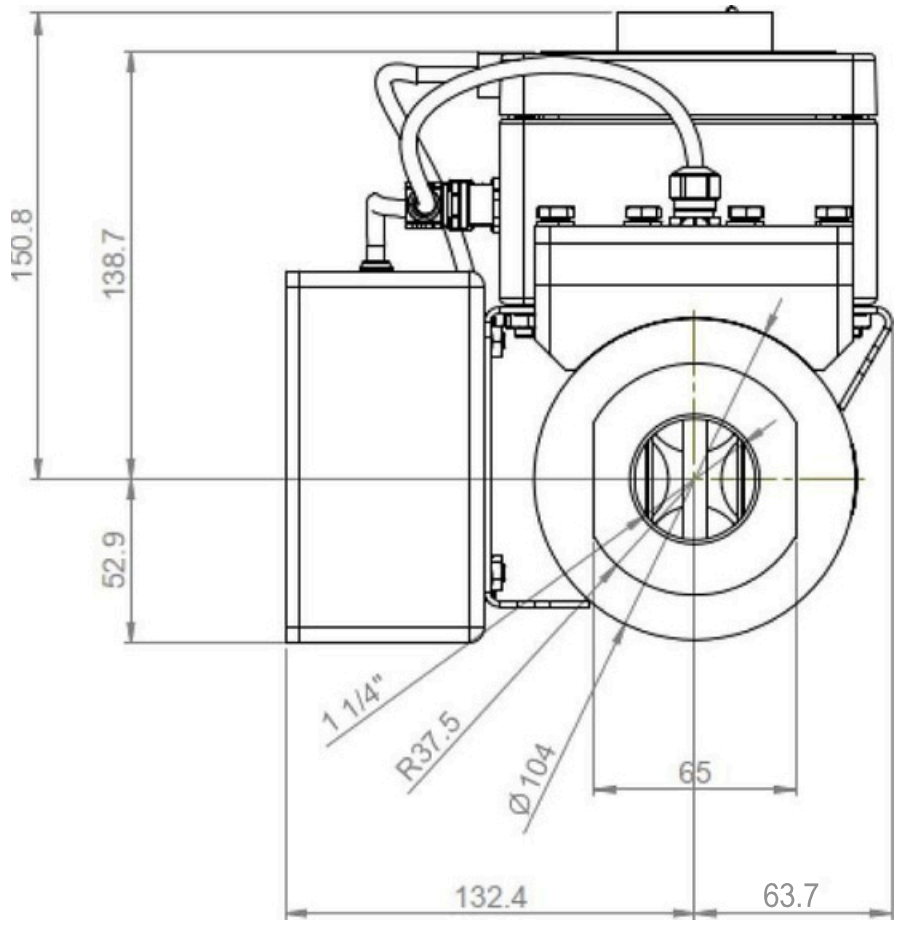
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WATER TREATMENT HAS NEVER BEEN SO EASY

1. We will advise you in detail and offer you a customized solution tailored to your needs.
2. Simple installation and instruction by one of our specialist partners in your area.
3. Service and cost-effective maintenance by our experts.

Sustainable

Our products are particularly low-maintenance and guarantee a long service life.

Qualitative

Evodrop's technologies guarantee consistently high quality and performance.

Scientific

Our quality is based on solid research and
Underpinned by studies.

Environmentally friendly

We protect the environment with pure physics and without chemicals

Swiss Made

We rely on "Swiss Made" and Swiss quality standards.

Your swiss trust partner for the guaranteed best water

+41 78 79 333 07

Arrange your non-binding consultation appointment now and let us inspire you over the phone or in person on site.

Will of Water GmbH
Max-Högger-Strasse 6 | CH-8048 Zürich
hello@willofwater.com | www.willofwater.com