

CaviPlasma

Our device – CaviPlasma – is advanced oxidation technology, which efficiently removes the below-mentioned micropollutants.

Removal of micropollutants is a topical problem in wastewater treatment. New legislation anticipates increased removal of pharmaceuticals (analgetics, antibiotics, antidepressants, etc.), herbicides, pesticides, estrogens, and volatile organic compounds from wastewater. These cannot be removed by mechanical or biological treatment.

Besides that, it can also produce so-called plasma-activated water with the content of oxygen, which can be used as an environmentally friendly disinfectant.



Seeking

Development partner
Commercial partner
Licensing
University spin out
Investment

IP Status

Patents in force so far:
CZ and IL

Contact

Radoslav Trautmann, Ph.D., MBA
Masaryk University
Technology Trasfer Office
✉ trautmann@ctt.muni.cz
☎ +420 54949 8218

TECH OVERVIEW

The invention relates to a method of generating a low-temperature plasma in liquids that is suitable for plasma treatment of liquids, solids, and gases. The device can be utilized for water decontamination and disinfection of both wastewater and drinking water. The equipment can also be used for the treatment of hydrocarbon-based liquids such as oils or paints. The principle of the device is based on the generation of plasma in the cavitation area, i.e. the point where the liquid is converted into vapour.

CaviPlasma utilizes the synergistic effect of hydrodynamic cavitation and low-temperature plasma discharge. Hydrodynamic cavitation provides a gaseous environment from saturated vapour, which is favourable for the ignition of plasma discharge between high-voltage electrodes. Plasma discharge induces plasmochemical reactions and UV radiation. The resulting dissociation of water molecules produces hydroxyl radicals OH⁻, which then form hydrogen peroxide with strong oxidation effects.

CaviPlasma was successfully tested for removal of pharmaceutical residuals (analgesics, antibiotics, antiepileptics), estrogen (4 types), bacteria (*S. aureus*, *E. coli*, *Flavobacterium*), cyanobacteria, and algae.

Plasma activated water was successfully applied for removal of resistant *S. aureus* strains, *E. coli*, *Pseudomonas aeruginosa* in a hospital environment.

BENEFITS

- Efficient removal of micropollutants using strong oxidation (hydrogen peroxide, strong electrical field)
- Can be used for removal of both biological and chemical contaminants
- Compared to other plasma technologies CaviPlasma features high flow rates of treated water (up to 15 m³/hour on our largest device)
- Power input less than 1 kW/m³

APPLICATIONS

- Removal of micropollutants from wastewater (pharmaceuticals, pesticides, herbicides, estrogens)
- Quarterly treatment of wastewater
- Elimination of pathogenic microorganisms (bacteria, cyanobacteria, viruses)
- Removal of algae (cooling towers and piping)
- Preparation of plasma-activated water (PAW) for decontamination of surfaces
- Application in agriculture (against fungal, bacterial, and viral diseases of plants), improving seed germination
- Elimination of bacteria in fisheries
- Plasma treatment of liquids, solids and gases
- Treatment of hydrocarbon-based liquids such as oils or paints

COMMERCIAL OPPORTUNITY

We are seeking potential partners in development (financial support of further development), commercialization (licensing), and exploration of further application potential.