Method for Disinfecting Liquids in a Dense Fluid Plasma Reactor

Published date: March 14, 2017

Technology description

Certain bacteria can exist both in the vegetative state and as spores. Spores are dormant states that bacteria assume during nutritionally unfavorable conditions. In the dormant state, spores undergo no detectable metabolism and exhibit a higher degree of resistance to inactivation by wet and dry heat, freezing, UV and gamma radiation, extreme desiccation and oxidizing agents. As a result, harsher processes are required to inactivate the spores in food and water. The key to destroying spores comes in damaging their protective outer layers to provide access to the core for traditional disinfection treatments. UW–Madison researchers have developed an efficient new method for disinfecting liquids, especially water, by using a dense medium plasma (DMP). Water is placed inside a DMP reaction vessel and vigorously stirred between two electrodes. Multiple spark discharges between the electrodes then produce reactive plasma species, including electrons, ions and free radicals, which inactivate any bacteria, fungi or other microbes present in the water. In a second sterilization method, which can be applied alone or in conjunction with the first, the plasma reactor is used to generate antimicrobial colloidal nanoparticles, especially silver nanoparticles, which interact with microbial cells and deactivate them.
The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method of using plasma to disinfect liquids.

Application area

Disinfecting water, food processing equipment and medical and dental instruments

Advantages

Particularly well suited for disinfecting liquids contaminated with highly resistant bacterial spores
Plasma operates at atmospheric pressure, eliminating the need for complex and expensive vacuum systems.
Achieves sterilization in as little as five minutes
Plasma’ s dense medium can be selected to avoid creating unwanted byproducts during disinfection.
Electrodes can be constructed for easy installation and removal.

Institution

Wisconsin Alumni Research Foundation

Inventors

Sorin Manolache
Ferencz Denes
Amy C. Lee Wong
Eileen Somers

联系我们

叶先生

电 话：021-65679356
手 机：13414935137
邮 箱：yeyingsheng@zf-ym.com