BioDiscovery 20: e21977
doi: 10.3897/biodiscovery.20.e21977

Conference Abstract

Innovative sterilization technology - bacterial inactivation by cold argon plasma

Yovana Todorova‡, Ivaylo Yotinov‡, Yana Topalova‡, Plamena Marinova§, Evgenia Benova|, Mariana Atanasova|, Todor Bogdanov¶

‡ Sofia University, Faculty of Biology, 8 Dragan Tzankov Blvd., 1164, Sofia, Bulgaria
§ Sofia University, Faculty of Physics, 5 James Bourchier Blvd., 1164, Sofia, Bulgaria
| Sofia University, DLTIS, 27 Kosta Loulchev str., 1111, Sofia, Bulgaria
¶ Medical University Sofia, Faculty of Medicine, 2 Zdrave str., 1431, Sofia, Bulgaria

Corresponding author: Yovana Todorova (yovana.todorova@gmail.com)

Received: 31 Oct 2017 | Published: 03 Nov 2017

Citation: Todorova Y, Yotinov I, Topalova Y, Marinova P, Benova E, Atanasova M, Bogdanov T (2017) Innovative sterilization technology - bacterial inactivation by cold argon plasma. BioDiscovery 20: e21977. https://doi.org/10.3897/biodiscovery.20.e21977

Abstract

Non-thermal (cold) plasma is subject of intensive scientific interest as an alternative sterilization technique for advanced control of microbial quality and safety in food biotechnology. The cold plasma is a flow of weakly ionized gas at atmospheric pressure that includes radicals, H_2O_2, O_3, ultraviolet radiation, charged particles, exited metastable atoms, electric fields. One of the major benefits of plasma-based technologies is the synergy between the strong effects of these highly active components that provides a high bactericidal efficiency at low costs, time-saving and non-toxicity. The aim of this study is to assess the bactericidal effect of cold argon plasma in liquids and surfaces, contaminated with Gram-negative and Gram-positive spore-forming bacteria. The used plasma source is surface-wave-sustained discharge (SWD) operating at 2.45 GHz in argon (plasma torch) produced by an electromagnetic wave launcher surfatron type. The bactericidal effect was studied by direct contact treatment of contaminated liquids and agar plates with *Pseudomonas aureofaciens* AP-9 and *Brevibacillus laterosporus* BT-271. The results show that the cold argon plasma is able to inactivate bacteria at short exposure time (under 1 min). The clear sterilization zones on treated surfaces with diameter depending on exposure time and initial bacterial density were obtained. In bacteria-contaminated liquids

the partial disinfection was observed at least. The potential of plasma based technologies as innovative sterilization approach is high and can be used for various purposes related to microbial control and food safety.

Keywords

cold argon plasma, bacterial inactivation, microbial control and safety

Presenting author

Yovana Todorova

Funding program

Acknowledgments: This work was supported by Bulgarian Fund for Scientific Research under Grant No DN 08/8/2016.

Hosting institution

Sofia University St. Kliment Ohridski