2014 Annual Meeting of The Institute of Electrostatics Japan
Hiroshima International University
September 7-8, 2014

8aC-1

September 8th (Mon.), <10:30-11:45>
Room 3

Development of Advanced Water Treatment System Using Discharge-induced Plasmas

○Seiji KANAZAWA*, Yuki ANAN*, Hiroyuki HAYASHI*, Shuichi AKAMINE*, Ryuta ICHIKI*,Taketoshi YAMAMURA**, Yutaka YAMAHIRA**, and Youichi HONZI*

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Abstract:

Advanced oxidation processes (AOPs) are well known for the treatment of waste water. AOPs are facilitated by the use of the combination of UV, ozone, and chemical agents such as hydrogen peroxide. Especially, it is considered that the hydroxyl radicals (・OH) play the important role in the process. In this study, a novel advanced oxidation process using the discharge-induced plasma is proposed. We have developed a system which is combined with filtration, ozonation, and plasmas. The basic property of the discharge-induced plasma is introduced and then the performance of the system is evaluated.

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Plasma characteristics of discharge in a cell culture medium

○Yusuke Sato*, Takehiko Sato**, Daisuke Yoshino**

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Abstract:

To apply a plasma directly to cells, generation of plasma in a cell culture medium and its characteristics have been investigated. Although there are many studies of plasma in liquids, generation of plasma in a cell culture medium has not been reported. In this study, to reveal plasma-emission species and effect of organic compounds in a culture medium, we investigated the spectrum of plasma emission, OH intensity and H2O2 concentration by comparing with the results of chloride solutions. The spectra analysis showed little difference between the cell culture medium and the chloride solutions. OH intensity and H2O2 concentration had a more relationship with electrical conductivity than chloride species in liquids.

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Room 3

The Effect of Oxygen Concentration and Water Vapor Evaporated from Agar on Spore Sterilization Using Plasma

Masayuki KOMATSU

The University of Tokyo

Abstract:

The effects of oxygen concentration and water vapor evaporated from agar medium on plasma sterilization of spore are examined. A nanosecond pulsed streamer discharge is used. The sterilization rate increases with decreased N2 gas flow rate. It indicates that reactive species produced from water vapor evaporated from the agar medium, such as OH and H2O2, sterilizes the spore because the humidity on the agar medium due to the evaporated water from the agar medium increases with the decreased N2 gas flow rate. The spore is also sterilized by O3. The sterilization area by O3 is much wider than that by the reactive species from H2O.

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Room 3

Inactivation of microorganisms on the spherical solid surface with DBD

Takuya ARISAKA, Takanori TANINO and ○Takayuki OHSHIMA

Graduated School of Engineering, Gunma University

Abstract:

Inactivation of microorganism on the surfaces, such as a soybean and rice, is important in food engineering.

In this research, we used a biodegradable plastic sphere, which has 6 mm in diameter, as a food solid model. The plastic spheres of 25 g were immersed in Aspergillus niger or Bacillus subtilis spore suspension, and dried at room temperature overnight. The cell concentration of A. niger and B. subtilis spore suspension were 1.0×108 CFU/mL and 1.0×106 CFU/mL, respectively. The electric discharge unit consisted of the silica glass board and the aluminum two tapes, and AC high voltage (6.2 kVp and

30kHz) was applied to the aluminum tape. DBD (Dielectric Barrier

Discharge) was generated between the aluminum tapes. The electric discharge unit was put on a rotary shaker (75 rpm), and survival ratios were measured before and after DBD treatment. In the case of A. niger, the survival ratio after DBD treatment of 30 min was 10-5. This system was useful for the inactivation of mold on the solid surface. However, it was hard to inactivate B. subtilis spore with our system. It is thought that expansion of discharging space and protraction of contact time are required in order to inactivate B. subtilis spores.