

Generation of Solution Plasma for Surface Treatment

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Abstract

Solution plasma has been generated in ultrasonic bubbles with new-type electrodes by supplying alternative power. We found solution plasma can be generated in various solvents by applying this technique. Now we try establishing the plasma generation and its application for surface treatment

Keyword: Solution plasma; ultrasonic; electrode structure; alternative current

Solution plasma means plasma in liquid phase [1]. Compared with the plasma in gas phase, this solution plasma is not widely utilized. Of course nowadays it was utilized as water clarification, fabrication of nanoparticles, and so on. However, such applications were not sufficient, because the possibilities of solution plasma were not fully utilized. One of the new challenges is for anaerobic treatment. Therefore we have to develop the surface treatments and its plasma source. This application requires the solution plasma in various solvents with large-scale and glow-like discharge.

Solution plasma was generated by applying DC voltage, AC voltage or low-frequency high voltage to the bubbles generated with an ultrasonic homogenizer in various solvents: the ultrasonic homogenizer (Kaijo) has a stainless steel horn 30 mm in diameter. It was used in the experiments to irradiate pure water, dodecane, ethanol at 600 W and 20 kHz. Iron wire was used as electrodes. The feature of plasma was evaluated with optical emission spectroscopy, current

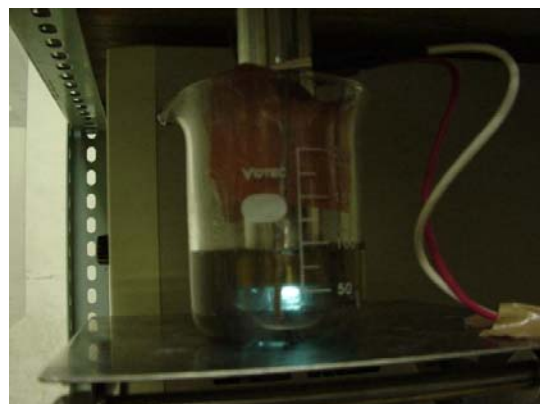


Fig.1 Generation of Solution plasma

-voltage characteristics.

We will discuss the difference of plasma generation and its feature induced by DC, AC, and low-frequency high voltage supply. Moreover, we will discuss its application for anaerobic treatment.

References

1. O. Takai, proceedings of ISPC 2007, p. 431.

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