

Advanced Microwave Plasma Technology for Liquid Treatment

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Recently, much attention has been given to plasma production under liquid and its applications [1]. However, most of plasma production techniques reported so far utilize high voltage dc, ac, rf or microwave power [2], where damage to discharge electrodes and small discharge volume are remained issues. As an alternative of plasma production method under liquid, we have proposed pulsed microwave excited plasma using slot antenna, where damage to the slot electrode can be minimized and plasma volume can be increased. We have also reported improvement of treatment efficiency with use of reduced-pressure condition during the discharge [3]. To realize low pressure conditions in liquid, various alternative technique can be considered. One possible technique is simultaneous injection of microwave power and ultrasonic wave. Ultrasonic wave induces pressure fluctuation with the wave propagation and is so far used for cavitation production in the water. We propose utilization of reduced pressure induced by ultrasonic cavitation for improvement of the plasma production. Correlation between the plasma production and the ultrasonic power will be discussed.

References

[1] K. Yasuoka: IEEJ,Trans. FM, 129,15 (2009).

[2] T. Miuchi, T.Fujimoto, T.Takeda.: IEEJ, Trans. FM, 131, 853 (2011).

[3] R. Saito, K. Kanetake, T. Ishijima and H. Toyoda,Conf. Abst. IS-Plasma2010, (2010) p.193.

Keywords: Plasma, microwave, liquid

플라즈마를 이용한 도파민 합성(Synthesis of Dopamine by Plasma)

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Synthesis of catecholamine from aniline is achieved by plasma enhanced CVD process. Catecholamine has a variety of functions in body such as brain and bloodstream controls. Catecholamine also has an interesting property of a material independent ability of functionalizing surface, which is found at mussels' adhesive nature. Synthesis of catecholamine has only been available from DOPA by chemical reduction and oxidation. This study presents the direct synthesis of catecholamine from further elemental source, aniline, which has not been achieved by a conventional chemical method. The process also indicates that a variety of catecholamine can be formed by controlling reactant gases. In addition to PECVD's very useful properties such as conformal, ultrathin and uniform coatings, a direct synthesis from aniline and a capability of controlling formation of a variety catecholamine is believed to open up a numerous applications.

Keywords: catecholamine, dopamine, plasma, PECVD

Dependence of hydrophilic surface property of catecholamine coatings on plasma deposition conditions

