Nitrogen Monoxide Generation by Microwave Plasma Torch

Hansup Uhm [1]

[1]*New Industry Convergence Technology R&D Center, Ajou University, Korea, Republic of*

One of the scientific issues is the reduction behavior of nitrogen oxides by flames of hydrocarbon fuels in combustion science. The other issue is their application to differentiations of living cells. In this regards, we proposed to generate nitrogen monoxide by microwave plasma torch. An analytical theory indicates that nitric oxide density is nearly proportional to oxygen molecular density and that the high-temperature flame in a plasma torch is an effective means of generating nitric oxide. Experimental data pertaining to nitric oxide production are presented in terms of the oxygen input. The various levels of nitric oxide are observed depending on the flow rate of nitrogen gas, the mole fraction of oxygen gas, and the microwave power. The experimental data of the nitrogen monoxide generation agree remarkably well with the theoretical results from the analytical expression. We also observed [Ref. 1] that nitrogen oxides disintegrate in the fuel-burning flame exponentially in terms of the methane flow rate. Therefore, a microwave nitrogen-torch can easily provide an appropriate nitrogen monoxide concentration [Ref. 2] for the wound healings and other biological applications.

Ref. 1. Han Sup Uhm, Soon C. Cho, Il G. Park and Min S. Hong, ‘Reduction of Plasma Nitrogen Oxides by Flames of Hydrocarbon Fuel‘ Journal of the Korean Physical Society, Vol. 52, No. 6, 1800 (2008).

Ref. 2. Han S. Uhm, Young H. Na, Eun H. Choi, and Guangsup Cho, ‘Dissociation and excitation coefficients of nitrogen molecules and nitrogen monoxide generation,’ Physics od Plasmas 20, 083502 (2013).

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