

UV Absorption Spectroscopy for Absolute Concentration of RONS in Plasma



Activated Water Treated by Atmospheric-Pressure Helium Plasma Jet

Kochi Univ. Technol.¹, Center for Nanotechnology, Kochi Univ. Technol.²,

Jun-Seok Oh^{1,2}, Satsuki Ito¹, Maito Kakuta¹, Hiroshi Furuta^{1,2} and Akimitsu Hatta^{1,2}

E-mail: jun-seok.oh@kochi-tech.ac.jp

Plasma activated water (PAW) also referred to as plasma treated water (PTW) is gaining importance in recent research area at the Plasma Physics-Life Science interface.^[1,2] PAW is well known of bactericidal effect which to be extremely strong under acidic condition, especially below a critical pH value of 4.7. Since to solve the mechanisms, the correlation between the chemistry of PAW and the bactericidal effect was studied by a number of method such as electron spin resonance (ESR), ion chromatography, free radical scavenging activity, Fourier transform infrared spectroscopy (FTIR), and UV-Vis absorption spectroscopy. So far, many studies revealed that the presence of various reactive oxygen and nitrogen species (RONS) in PAW is strongly correlated to the bacterial inactivation and the studies also confirmed the long-term bactericidal activity.

We have used UV absorption spectroscopy to investigate RONS, especially long-living RONS in PAW. In recent, we have considered the absolute concentration of RONS which could be estimated by knowing absorptivity of standard reference solutions e.g. H_2O_2 , NO_3^- and NO_2^- . In this work, we discussed the absolute concentrations of the plasma-generated RONS for the results of our previous study of the production efficiency η of mm-jet and μ -jet, presented at the spring meeting. In addition, we report recent our studies regarding influence of RONS generation on plasma exposure time and treatment distance.

Acknowledgments This work was supported by Priority Research Grant, an internal university fund.

- References**
- [1] S. Ikawa, K. Kitano and S. Hamaguchi, *Plasma Process. Polym.* **7** (2010) 33.
 - [2] P. Bruggeman and C. Leys *J. Phys. D: Appl. Phys.* **42** (2009) 053001.

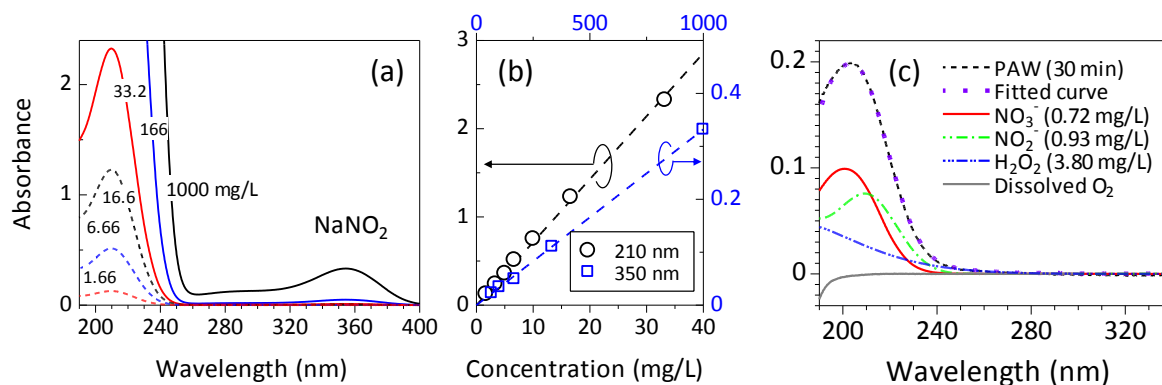


Figure (a) shows absorption spectra of a reference solution NaNO_2 , **(b)** absorptivity of correlated NO_2^- peaks at 210 nm and 350 nm and **(c)** a curve fitting result of PAW (3 mL in 60 mm petri dish) with the treatment distance of 15 mm and the exposure time of 30 min.