Abstract Submitted
for the GEC16 Meeting of
The American Physical Society

OH rotational temperature measurements via a two temperature distribution analysis in plasma with water microdroplets MASANAO TSUMAKI, TSUYOHITO ITO, Osaka University — We study plasma processing with water/solution microdroplets for a new nanoparticle synthesis method. In the process, it is important to know gas temperature (Tg) for understanding the mechanism of the particle growth and controlling its properties. Since OH emissions are naturally observed in such plasma, the rotational temperature (Tr) of OH (A-X) is estimated and compared with Tr from N_2 (C-B). The plasma is generated by dielectric barrier discharges in He with N_2 (2.6 %) gas flow, and microdroplets are generated by an ultrasonic atomizer and carried into He/N_2 plasma. Optical emission spectroscopy revealed that with the increase of voltage and frequency of plasma generation, the Tr of N_2 increases. While the good theoretical spectrum fit on N_2 experimental spectrum could be achieved, it was hard to obtain a reasonable fit for the OH spectrum with a single rotational energy distribution. On the other hand, two rotational distribution analysis could reproduce the experimental spectrum of OH and the lower Tr agrees to Tr by N_2. The results suggest that the lower Tr obtained with the two rotational temperature analysis of OH spectrum represents Tg of the environment.

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Date submitted: 09 Jun 2016 Electronic form version 1.4