Abstract Submitted
for the GEC10 Meeting of
The American Physical Society

Measurement of Nitrogen Dissociation Degree of Nitrogen Discharge Plasma by Actinometry Method with Subtraction of First Positive Band Spectrum HIROSHI AKATSUKA, KEI KUWANO, ATSUSHI NEZU, HARUAKI MATSUURA, Tokyo Institute of Technology — Actinometry method to find dissociation degree of nitrogen molecule in a nitrogen discharge plasma is reported. The spectral lines from the excited nitrogen atom appropriate for the actinometry measurement lie in the wavelength region 742-747 nm. Their intensity is sometimes so weak that they are seriously overlapped by the first positive band spectrum (1PS) from the B-state of nitrogen molecule. We describe the method to calculate the complicated 1PS band spectrum. The fitting by the vibrational and rotational temperatures can reproduce the 1PS band spectrum. The subtraction of the calculated 1PS spectrum from the experimentally observed one can successfully extract three lines of atomic nitrogen, which enables us to actinometry measurement of nitrogen dissociation degree. Next, we demonstrate the measurement of dissociation degree of microwave discharge nitrogen plasma diluted with one species of rare gases. The nitrogen dissociation degree becomes lower with increasing the mixture ratio of Ar and Kr, while it becomes higher with He, which is attributed to the variation in the electron temperature. When we dilute the nitrogen with neon, we find marked increase in the nitrogen dissociation degree.

Hiroshi Akatsuka
Tokyo Institute of Technology

Date submitted: 31 May 2010 Electronic form version 1.4