

マイクロ波放電 $\text{N}_2\text{-O}_2$ 混合気体プラズマ中の NO 分子 B, C 励起状態の分光測定と粒子数の計算

Spectroscopic Measurement and Number Density Calculation of NO (B, C) excited states in $\text{N}_2\text{-O}_2$ mixture microwave discharge

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Lots of theoretical models and experiments for high and low-pressure plasma were carried out to discuss their chemical kinetics under different plasma conditions. These researches always focus on the particle with numerous number densities such as N_2 , O_2 molecules, and N and O atoms. In some cases, the NO molecule is mentioned but only the NO ground state is considered. However, the basic investigation on NO molecules is not enough, especially on its excited states.

Many OES measurements have been experimentally performed on low-pressure $\text{N}_2\text{-O}_2$ plasmas. Among them, γ -band (from $\text{A } ^2\Sigma^+$ to $\text{X } ^2\Pi$) has been frequently observed. Meanwhile, δ -band (from $\text{C } ^2\Pi$ to $\text{X } ^2\Pi$) can be seen when γ -band is spectroscopically not too wide (i.e. with low rotational temperature) and gas temperature should be high enough. And β -band (from $\text{B } ^2\Pi$ to $\text{X } ^2\Pi$) is rarely visible except at some harsh conditions (afterglow plasma when $\text{N}_2 = 96 - 99.5\%$). We measured the experimental spectra and calculated the number densities during discussion. Further details will be given in the presentation.

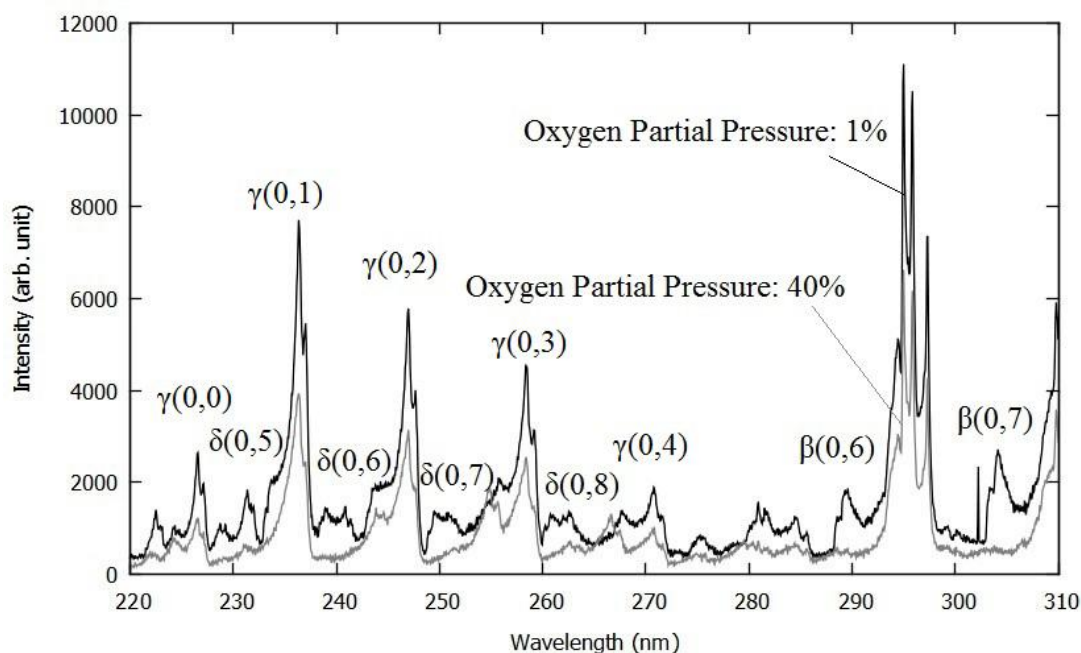


Fig 1. Experimentally observed spectra over the wavelength range 220-310 nm with oxygen partial pressure 1% (black line) and 40% (grey line). γ , β and δ bands are specified. Brackets denote vibrational quantum numbers (upper,lower) involved.