IDENTIFICATION OF THE $^3\Sigma_u^-$ AND $^3\Pi_u$ RYDBERG STATES OF O_2 BY DETECTING $O(^1D)$

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The excited states of O_2 in 100-135 nm region consists of many Rydberg states which are still not well understood. We have investigated the excited states of O_2 dissociated into $O(^1D)$+$O(^3P)$. The experiment was conducted in a gas celll using the synchrotron radiation as the excitation source. $O(^1D)$ was detected by the infrared emission at 762 nm produced from the $O_2(b^1\Sigma_g^+)$ formed by the energy transfer process from $O(^1D)$ to O_2. A spectrum between 105 and 130 nm for producing $O(^1D)$ was obtained, which revealed the vibrational progression of the n$^3\Sigma_u^-$ states for n=2 to 4. By comparing with the absorption spectrum, the $^3\Pi_u$ state correlated with $O(^3P)$+$O(^3P)$ was also obtained.