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Decomposition of m-xylene by $N_2(A^3\Sigma_u^+)$ and thin film deposition SUSUMU SUZUKI, Chiba Institute of Technology, MITSUO SHIMOZUMA, Hokkaido Institute of Technology, HARUO ITOH, Chiba Institute of Technology — The study has carried out on the determination of the collisional quenching rate coefficient of $N_2(A^3\Sigma_u^+)$ by m-xylene (C_8H_{10}), which has the weakest bonding strength among the three isomers of xylene. In our first attempt, the collisional quenching rate coefficients of $N_2(A^3\Sigma_u^+)$ by xylene (o-xylene, m-xylene, and p-xylene) have not yet been reported to the best of the authors' knowledge. The diffusion coefficient $D_{m1}$of $N_2(A^3\Sigma_u^+)$ in N_2/(1ppm) m-C_8H_{10} mixtures and the collisional quenching rate coefficient k' of $N_2(A^3\Sigma_u^+)$by m- xylene is determined as 151.5±0.7 cm^2/s and $(4.4\pm0.6)\times10^{-9}$ cm^3/s, respectively. Surprisingly, it is found that any by-product of xylene is deposited on the cathode, through repeated experiments, and then the current-voltage curves consistently shift to the higher-E/p_0 region. For the purpose of clarifying the reason behind this behavior, we have confirmed that these changes in the current-voltage curves are caused by the thin-film deposition of a by-product of decomposed xylene on the cathode surface by Auger electron spectroscopy.

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