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Reaction DB construction of Perfluorocarbons for Plasma process simulation SATOSHI NAKAMURA, REI SAKUMA, ET Center, Samsung RD Institute Japan, SUN-TAEK LIM, Semiconductor RD Center, Samsung Electronics, SHOGO SAKURAI, HIROYUKI KUBOTERA, KIYOSHI ISHIKAWA, ET Center, Samsung RD Institute Japan, KEUN-HO LEE, Semiconductor RD Center, Samsung Electronics — Plasma process simulation plays an important role for the development of plasma etching process in the semiconductor industry. Although the results of the simulation are primarily depends on DB of the cross section and/or reaction rate for the scattering between molecules and electron in the gas phase, their data are still insufficient. In this presentation, we propose a semi-empirical method to evaluate cross-sections for some perfluorocarbons which are widely employed in the plasma etching process. There are various established methods to calculate cross sections for impact dissociation via excitation process, dissociative/non-dissociative ionization, and dissociative electron attachment except for non-dissociative electron attachment (NDEA). Using specific relation between peak value and peak energy of the cross section from experimental data for NDEA of some perfluorocarbons (CF_4, C_2F_6, C_3F_8, and so on), and combined with first-principles calculations we obtained reasonable cross-sections for NDEA of molecules whose experimental data are absent. This approach will be applied for other gases and other types of reactions without NDEA to increase DB for Plasma process simulation.

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