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Effects of Discharge Current and Gas Flow Rate on CF_4 Abatement Process by Thermal Plasma Decomposition[1] SOOSEOK CHOI, HYUN SEOK LEE, JUN SEOK NAM, WOO SEOK KANG, SANG HEE HONG, Seoul National University — Perfluorocompounds (PFCs) have been widely used in semiconductor and display industry for wafer etching and chamber cleaning processes. However, it is well known that PFCs are serious global warming gases. Although thermal plasma can efficiently decompose a significant quantity of waste gas, it has demerits of large consumption of electric input power and plasma forming gas in order to commercialize its processes. In this work, effects of arc current and plasma forming gas flow rate on the thermal plasma decomposition process have been experimentally demonstrated and numerically analyzed to improve its economic feasibility. A mixture of 1 % CF_4 and the rest N_2 purging gas of several hundreds slpm was decomposed by nitrogen thermal plasma generated from a plasma torch with hollow electrodes. The input powers were changeable from 40 to 60 kW depending on torch operating conditions for arc currents of 130 through 150 A and plasma gas flow rates of 70 through 90 slpm. At a high current of 150 A and a low gas flow rate of 70 slpm condition, the corresponding input power was about 40 kW and over 96 % of destruction and removal efficiency was achieved for 200 slpm waste gas.

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