

## Decomposition of PFCs by low power arc plasma system

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Perfluorocompounds (PFCs) are serious non-degradable global warming gases. Although thermal plasmas can decompose PFCs with a high conversion rate, they consume electricity on a large scale. In the present work, a low power arc plasma torch has been developed to reduce operating cost of the thermal plasma gas treatment process. Effects of the net power of plasma flame and reactive gas additives on the destruction and removal efficiencies (DRE) for typical PFCs were examined. The input power and waste gas flow rate were controlled from 2 to 3 kW and from 70 to 150 L/min, respectively. The maximum DREs of  $\text{NF}_3$ ,  $\text{SF}_6$  and  $\text{CF}_4$  were 90%, 15% and 4%, respectively, without reaction gases at the highest input power of 3 kW and the lowest waste gas flow rate of 70 L/min. The DRE of PFCs, however, were notably improved with a small amount of additional reactive gases. Hydrogen showed better effect to decompose PFCs than oxygen. With the help of reactive hydrogen, DREs of  $\text{NF}_3$ ,  $\text{SF}_6$  and  $\text{CF}_4$  were improved to 99.2%, 39.3% and 25.0% respectively, even in the case of increased waste gas flow rate of 100 L/min at the fixed input power of 3 kW.