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8 Abstract

Double surface dielectric barrier discharge (DSDBD) can simultaneously form two 9 uniform plasma zones for ozone synthesis with an AC power supply, thus exhibiting 10 great advantages in achieving high energy yield at high ozone concentration. However, 11 effects of the experimental parameters on DSDBD is urgently to be investigated to 12 optimize the discharge reactor and provide reference for high-efficiency ozone 13 generator design. Here we present a systematical experimental study of the DSDBD 14 in oxygen for ozone generation. The effects of important parameters (gas-flow mode, 15 dielectric, discharge gap, etc.) on DSDBD in oxygen were studied, and the optimal 16 DSDBD reactor was screened out. The optimal DSDBD reactor can achieve ozone 17 energy yield of 317.7-130.0 g/kWh within ozone concentration of 12.7-56.2 g/Nm³ 18 and exhibit an excellent stability during a 2-hour continuous test, demonstrating its 19 much better performance in ozone synthesis than other conventional DBDs. The 20 discharge characteristics and the optimization results suggest that the superior 21 performance of the optimal DSDBD reactor lies in its complete interaction of oxygen 22 and plasma, large numbers of reactive species and electrons as well as favorable 23 energy distribution of the reactive species. 24

Keywords: Ozone synthesis, non-thermal plasma, surface discharge, dielectric
barrier discharge, discharge characteristic diagnosis

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