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Optimization of Industrial Ozone Generation with Pulsed Power
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Ozone (O3) is widely used for applications ranging from various industrial chemical synthesis processes to large-scale water treatment. The consequent surge in worldwide demand has brought about the requirement for ozone generation at the rate of several hundreds grams per kilowatt hour (g/kWh). For many years, ozone has been generated by means of dielectric barrier discharges (DBD), where a high-energy electric field between two electrodes separated by a dielectric and gap containing pure oxygen or air produce various microplasmas. The resultant microplasmas provide sufficient energy to dissociate the oxygen molecules while allowing the proper energetics channels for the formation of ozone. This presentation will review the current power schemes used for large-scale ozone generation and explore the use of high-voltage nanosecond pulses with reduced electric fields. The created microplasmas in a high reduced electric field are expected to be more efficient for ozone generation. This is confirmed with the current results of this work which observed that the efficiency of ozone generation increases by over eight time when the rise time and pulse duration are shortened.

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