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Development of an Ozone-based Treatment System for Reuse of Personal Protective Equipment (PPE) JOHN LASSALLE, MD ABDULLAH HIL BAKY, MIN HUANG, KAVITA RATHORE, MATTHEW BURNETTE, DAVID STAACK, Texas AM University Department of Mechanical Engineering — Limited availability of PPE can pose hazards to health care and other essential personnel until an effective vaccine for COVID-19 is developed. Ozone has been proven effective for sterilization, and several plasma-based systems are capable of generating ozone and other reactive species. An ozone-based mobile treatment system for sterilization of personal protective equipment (PPE) was developed. Various ozone generation schemes were considered, including corona arrays and dielectric barrier discharges (DBDs). Effects of treatment on material properties, especially mechanical integrity, filtration effectiveness, and resistance to liquid penetration, of PPE and relevant materials were evaluated after treatment. Treated PPE included respirators and hospital gowns. Steady-state ozone concentrations from 1 to 30 ppm were targeted, and total ozone exposure varied from a few ppm-min to several hundred ppm-min. Bacterial cultures were used to evaluate pathogen reduction. Experimental parameters included humidity and temperature in the system, convection, and ozone generator power. Other aspects of system design, such as safety considerations and material compatibility, are discussed.

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