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Removal of siloxanes from landfill gases with the application of dielectric barrier discharge plasma MALIK TAHIYAT, NOUF ABBAS, TANVIR FAROUK, SHAMIA HOQUE, University of South Carolina — Utilization of landfill gas as renewable energy has been a topic of major interest since it is rich in methane. However, this gas also contains organosilicate compounds: volatile methyl siloxanes (VMS) as a contaminant. Oxidation of VMS forms silicates that erode both engines and environment. Present methods of VMS removal: activated carbon filters, silica gel, alumina and other adsorbents suffer from limited regeneration capability, low adsorption capacity, and recycling needs. In this study, a typically dominant VMS, D4 ($C_8H_{24}O_4Si_4$), was removed by application of dielectric barrier discharge (DBD) plasma. D4 siloxane was bubbled into a helium carrier gas stream and passed through an annulus DBD reactor. GCMS analysis of the treated gas stream showed traces of CO and CH_4 implying dissociation of Si-C bonds. A white solid residue was also found to deposit on reactor walls. X-ray photoelectron spectroscopy and two-dimensional NMR spectroscopy confirmed the residue to be polydimethylsiloxane, suggesting that DBD plasma had polymerized D4 in contrast to completely dissociating. Further study is underway to provide valuable insight into how bond scission of D4 can be further propagated.

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