

Surface acid chemistry associated with dielectric barrier discharge (DBD) treatment of polyethylene

The chemistry associated with atmospheric dielectric barrier discharges (DBDs) in air has been studied. Laboratory and industrial DBD systems have been investigated. In this work, we have emphasized the use of aqueous extractions of treated surfaces, followed by analyses by ion chromatography to study the DBD chemistry. A range of DBD factors including dose, humidity, airflow and electrode configuration (one versus two dielectric barriers) is found to influence the levels of acids, notably nitrous, nitric and oxalic acids, on the treated surfaces. A mechanistic rationale involving the primary formation of the nitrous and nitric acids in the gas phase is proposed.