Surface Dielectric Barrier Discharges for the dissociation of hazardous compounds in gas-phase

R. Barni[1], M. Rashid[1], H.E. Roman[1], C. Riccardi[1]

[1] *Dipartimento di Fisica G. Occhialini, Università degli Studi di Milano-Bicocca, Milan, Italy*

Non equilibrium plasmas produced by Dielectric Barrier Discharges (DBD) have been proposed long ago as one of the most promising tools for technological applications of plasmas [1]. Using a suitable electrode geometry the discharge could be confined to the surface of the dielectric barrier (SDBD) and interact only in a mediate way with the target of the plasma treatment.

DBDs and SDBD driven by high voltage signals applied to electrodes happen generally in short bursts of activity. There are several tricky aspects, including the geometry of the electrodes and the charging of the dielectric material surface facing the discharge region. The production of reactive species and the capability to dissociate or dispose of harmful or unwanted compounds also depend on the interplay between the energy transferred to the discharge and their repetition and respect to the incoming flow.

Here we present the results of an experimental campaign aimed to the disposal of Volatile Organic Compounds (VOC) in a gas-phase exposed to our SDBD plasma device.

We also present the results of an experimental characterization of the discharge and of the plasma gas-phase, based on spectroscopy and time resolved imaging [2].

We discuss briefly also modelling of the plasma gas-phase the prospect of using suitable pulsed discharge operation to improve the dissociation efficiency of VOCs [3].

References

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