**DBD discharge process for COV depollution of gases through radical mechanisms and polymerization - Industrial scale-up development**

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Our goal is to open a new way for gas depollution which use low energy consumption and is able to treat large volume of gas phase from industrial plant.

In the first part we point out the European directives for gas phase depollution (usually few ppm) and in a second step we underline the main parameter: the energy consumption.

From those constraints the goal is to create an innovative way for gas depollution that mean for the elimination of COV (volatile organic compounds) and fine particles of carbon or minerals.

From the more fundamental lecture we explain some routes which are able to work :DBD discharge in order to produce excited species which are able to react with organic molecules or modified the surface properties of small particles ,the goal is to coagulate or aggregate the heavy organic species and trap them on a fixed bed of zeolite beads ,for the small particle the electrostatic mechanisms permit to stick them on the zeolite surface .

The key step of this new process starts with the new DBD discharge created by Professor S.Dresvin :a large square of one hundred of electrodes ( HV and ground electrode) connected to a high voltage sources of 10KV and 40KHertz which inject the excited states of oxygen in the polluted gas flow . The mixing between them introduces new chemical species such as carboxyl groups ,radicals, and aggregate of heavy molecules which are trapped of a fixed bed of zeolite beads .

The chemical engineering simulation indicates that a three fixed beds were needed to reach the depollution level of 95% or from 1000ppm to 50 ppm .in order to control the global efficiency of the process we measure by mass balance and gas chromatography the nature of the pollutants at the entrance and at the outlet.

By using labelled molecules we were able to qualify some elementary reactions which indicated the role of atomic and excited states of oxygen species though that we were able to simulate the global depollution process for a simple laboratory DBD reactor .

From that results an industrial plant was built on the factory of bitumen aggregate of Perigueux (France ) and connected with the global production control ;the screen gives us the specific parameters of the DBD power ,voltage ,the gas flow of each fan ,and the pollutant control .

To conclude we have to remember that this process is well understand through the *fundamentalproperties of the excited states* from the DBD sources and connected with the knowledge of the *chemical reactivity of the plasma source*