Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

Modeling of a packed bed dielectric barrier discharge plasma reactor KOEN VAN LAER, None, ANNEMIE BOGAERTS, Prof. Dr. — The dielectric barrier discharge (DBD), as a source of non-thermal plasma, has been of interest for environmental applications for quite some time. Indeed, plasma can be an interesting alternative for conventional thermal methods, because the input energy solely goes to heating up the electrons, while the rest of the plasma particles (i.e. radicals, ions, neutrals) stay at room temperature. However, the feasible energy efficiency appeared to be on the low side. In order to overcome this, a dielectric packing was introduced in the gas gap of the reactor, forming a so-called packed bed plasma reactor (PBPR). Using COMSOL's built-in plasma module, two different complementary 2D axisymmetric fluid models are used to study the intrinsic 3D problem. As a first step, helium is used as discharge gas, at atmospheric pressure and room temperature. It was found that the contact points between the packing beads are of direct importance to initiate the plasma. Indeed, at low applied potential, the discharge is initiated directly at the contact points and stays in this region. However, when a high enough potential is applied, the plasma will be able to travel through the gaps in between the beads, spreading from one wall to the other.

Koen Van Laer
None

Date submitted: 18 Jun 2015 Electronic form version 1.4