Influence of the gap size and dielectric constant of the packing on the plasma discharge in a packed bed dielectric barrier discharge reactor: a fluid modeling study KOEN VAN LAER, ANNEMIE BOGAERTS, Plasmant, University of Antwerp — Packed bed dielectric barrier discharge (DBD) reactors have proven to be very useful sources of non-thermal plasma for a wide range of applications, of which the environmental applications have received most attention in recent years. Compared to an empty DBD reactor, a packing was introduced to either enhance the energy efficiency of the process, or, if the packing is catalytically active, steer the process towards a preferred end product. A wide range of geometries, bead sizes and bead materials have been tested experimentally in the past. However, since experimental diagnostics become more difficult with a packing present, a computational study is proposed to gain more insight. Using COMSOL’s built in plasma module, a 2D axisymmetric fluid model is developed to study the influence of the gap size and the dielectric constant ($\varepsilon$) of the packing. Helium is used as discharge gas, at atmospheric pressure and room temperature. By decreasing the gas gap, the electric field strength is enhanced, resulting in a higher number of current peaks per half cycle of applied rf potential. Increasing $\varepsilon$ also enhances the electric field strength. However, after a certain $\varepsilon$, its influence saturates. The electric field strength will no longer increase, leaving the discharge behavior unchanged.