Abstract Submitted
for the GEC16 Meeting of
The American Physical Society

A computational study of the plasma-flow interplay in a reverse vortex microwave discharge for CO_2 conversion VINCENT VERMEIREN, ANNEMIE BOGAERTS, PLASMANT University of Antwerp, PLASMANT UNIVERSITY OF ANTWERP TEAM — The problem of global warming due to greenhouse gas emission is one of the most prominent and urgent problems of the 21^{st} century. Recently, surface wave produced plasmas, created by a microwave discharge, have shown to be very efficient in the conversion of the main emitted greenhouse gas, namely CO_2. This is the result of a high thermodynamic inequilibrium in which the CO_2 is efficiently dissociated through vibrational excitation. Very promising results have been obtained in experiments using a reverse vortex gas flow (W.A. Bongers et al., ISPC 2015). Although it is known that reverse vortex gas flows tend to create a pressure and temperature drop in the center, it is unclear which effect the flow and the plasma have on each other. In this study we model this interplay between the reverse vortex gas flow and the plasma, to get a deeper understanding of the underlying processes. As a first step, Argon gas is used due to its simpler chemistry, limiting the computational costs. In a next step, a reduced chemistry set of CO_2 will be implemented.

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Date submitted: 08 Jun 2016 Electronic form version 1.4