Keep-in-Touch meeting
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Towards a detailed reaction mechanism set for CO_2-H_2O low temperature plasmas

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The vision of using plasmas to transform CO_2 into valuable products has become well recognized by the scientific plasma community. This is motivated by the potential of plasmas to activate CO_2 at reduced energy cost and excite CO_2 vibrations that efficiently contribute to overcome the dissociation barrier. Therefore, investigation of the steps involved in plasma decomposition of CO_2 is a key issue to move from the laboratory level towards industrial sector. This contribution is devoted to the modeling of CO_2-H_2O discharges, operating at pressures ranging from 1 to 5 torr. The following points will be addressed: (i) vibrational kinetics in CO_2 discharges, (ii) recombination chemistry in CO_2 discharges and (iii) electron kinetics in H_2O discharges. The first point updates the vibrational set initiated in [1] to cover vibrational exchanges in CO_2 plasmas under influence of decomposition products. The second point capitalizes on the building up experiments developed in [2] to analyze the validity of rate coefficients related to heavy particle collisions. Finally, the third point addresses the progress on electron impact cross section sets for H_2O using swarm-derived methods.

[1] T. Silva et al., PSST (27) 015019 (2018)

[2] A. Morillo-Candas et al., J. Phys. Chem. C (124) 17459-75 (2020)