Keep-in-Touch meeting
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CO_2 conversion by plasma: Towards a systematic approach to kinetic model validation

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CO_2 conversion by Non Thermal Plasma (and molecule synthesis in general) can be highly efficient when the formation processes rely on the use of short-lived species, whether radicals, or vibrationally and electronically excited states. In order to design efficient processes, we must first identify the precise role of these short-lived species, which are difficult to measure experimentally. Models, for their part, suffer from a lack of fundamental data to be really predictive. It is therefore essential to develop model/experiment comparison strategies in dedicated systems, enabling us to obtain reliable experimental data on a sufficient number of parameters to place strong constraints on kinetic models. We were able to develop such an approach based on time-resolved in situ measurements carried out in pulsed glow discharges as well as in pulsed radiofrequency batch reactors. These devices have enabled us to validate step-by-step kinetic models for pure CO_2, but also for mixtures of CO_2/N_2, CO_2/CH_4 etc. This approach can be systematized for application to other molecular systems such as N_2/H_2 plasmas. Another aspect that will be addressed concerns the interaction of plasmas with complex surfaces such as catalysts or ionic membranes, which are necessary to achieve efficient and selective conversion and synthesis processes.