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Plasma activated dissociation of CO_2 studied in a dielectric barrier discharge RICHARD ENGELN, Eindhoven University of Technology, P.O. Box 513, 5600 MB Eindhoven, The Netherlands, FLORIAN BREHMER, AFS GmbH, Von-Holzapfel-Straße 10, 86497 Horgau, Germany, STEFAN WELZEL, Dutch Institute for Fundamental Energy Research, P.O. Box 1207, 3430 BE Nieuwegein, The Netherlands, BART KLARENAAR, Eindhoven University of Technology, P.O. Box 513, 5600 MB Eindhoven, The Netherlands, RICHARD VAN DE SANDEN, Dutch Institute for Fundamental Energy Research, P.O. Box 1207, 3430 BE Nieuwegein, The Netherlands, TU/E COLLABORATION, AFS GMBH COLLABORATION, DIFFER COLLABORATION — The ever-increasing emission of carbon dioxide into the atmosphere as well as the intermittency problem of electricity produced by renewable energy sources are challenges that urgently need to be addressed. An approach addressing both issues at the same time is converting CO_2 to a fuel using plasma driven by electricity from renewable sources. We will present in this contribution the results of a study on the conversion of CO_2 to CO in a dielectric barrier discharge in pure CO_2 at pressures up to 1000 mbar: FTIR absorption and Raman spectroscopy were applied to measure CO number densities and gas temperatures as function of the specific injected energy. CO densities with a maximum at 10^{18} cm^{-3} (mixing ratio of 4.4%) at 46 kJ/sl, energy efficiencies in the range of a few percent and gas temperatures up to 550 K were detected. The CO production is directly linked with the total number of transferred charges q during the residence time t_{res} of CO_2 molecules. Also ozone has been detected with a maximum mixing ratio of 0.075%.

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