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Study of long lifetime DC microdischarges on silicon elaborated by MEMS fabrication techniques RONAN MICHAUD, ARNAUD STOLZ, SYLVAIN ISENI, OLIVIER AUBRY, PHILIPPE LEFAUCHEUX, GREMI, CNRS/Univ. Orleans, France, SEBASTIAN DZIKOWSKI, VOLKER SCHULZ-VON DER GATHEN, Ruhr-Univ. Bochum, Germany, LEANNE PITCHFORD, LAPLACE, Toulouse, France, RMI DUSSART, GREMI, CNRS/Univ. Orleans, France — DC microdischarges can operate in a stable and non-thermal regime at atmospheric pressure with breakdown voltage below 300V [1]. By MEMS fabrication techniques it is possible to elaborate micro hollow cathode discharge (MHCD) directly integrated on silicon. This provides a large field of applications like microsensors on chip or surface treatment. However using silicon as cathode material, the discharge does not operate in a stable regime and the lifetime is very short. By changing the cathode material, it is possible to obtain a stable discharge even at atmospheric pressure with a high current density operating in He during more than 24 hours [2]. This study compares three different geometries (planar, cavity and hollow) of long lifetime DC microdischarges operating in different gases (He, Ar, N2, mixtures) Experimental characterizations by electrical and optical measurements were performed and compared to simulations using a fluid model developed at LAPLACE (Toulouse). A portable device integrating these DC microdischarges was also developed for gas treatment applications. [1] K.H. Schoenbach et al 1997 Plasma Sources Sci. Technol. 6 468–477 [2] R. Michaud et al 2018 Plasma Sources Sci. Technol. 27 025005

Ronan Michaud
GREMI, CNRS/Univ. Orleans, France

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