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Student Excellence Award Finalist: Self organization of streamers in a surface DBD: evidence of collective breakdowns K. ALLEGRAUD, N. LEICK, O. GUAITELLA, A. ROUSSEAU, LPTP, Ecole Polytechnique, France — Surface dielectric barrier discharges (DBD) are mainly investigated for airflow control. In this paper, surface processes controlling the filament development are studied. Recent results have shown that in a cylindrical DBD, most of the energy is transferred via few large amplitude current peaks called collective effects [1]. To get further in the study of this phenomenon, electrical measurements and CCD imaging have been performed on a surface discharge, were the plasma filaments are generated onto the dielectric surface. The plasma is generated via several nearby (but distinct) filaments occurring simultaneously, the current peak duration being a few tens of nanoseconds. The current peak amplitude is proportional to the number of filaments, with a value of about 40 mA/filament. The filament length depends on the applied and breakdown voltages, independently from the current amplitude. The self-organization of the streamer breakdown in adjacent patterns is due to the simultaneous triggering of individual filaments via a collective effect. We suggest that the origin of such a self triggering is due to the photo-desorption of electrons from the surface by a first filament. These electrons then initiate the neighbouring filaments, and all the filaments contribute to the whole charge transfer. [1] O. Guaitella et .al, Phys. D.: Appl. Phys. 39(2006)

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