Abstract Submitted
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Phase-resolved imaging of the interaction dynamics in rf-driven microplasma arrays at atmospheric pressure[1] JEROME BREDIN, KATHARINA GROSSE, York Plasma Institute, Department of Physics, University of York, SAMEER AL-BATAINEH, ENDRE SZILI, ROB SHORT, Mawson Institute, University of South Australia, DEBORAH O'CONNELL, York Plasma Institute, Department of Physics, University of York — Atmospheric-pressure microplasmas are under development for future surface processing applications due to their decreased cost and high throughput compared to low-pressure configurations. Microplasma arrays are designed to achieve a large-area homogenous treatment. The investigated plasma source consists of a 7x7 micron-scale dielectric barrier discharges array operated in an atmospheric-pressure helium environment. The discharge is driven by radio-frequency (rf) power at 2 MHz and the power is pulsed at 1 kHz with an on-time of 90 rf cycles. Pulsed rf offers promise of improved control over the plasma properties and long operation lifetimes of the arrays. Nanosecond imaging (head-on and side observation) is used to investigate the spatio-temporal behaviour and the interactions between the cavities throughout the pulse. As a function of time within the pulse, distinct plasma dynamics are observed. This includes the formation of "glow" and "ring" shaped discharges as well as interactions between discharges. These depend on the dimensions of the cavities and the driving voltage. Through this study, we expect to be able to tailor conditions such as homogeneous operation and optimum species production.

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