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Propagation of a nanosecond pulsed discharge in ambient air at atmospheric pressure along a nanostructured surface THIBAULT DARNY, DAVID BABONNEAU, SOPHIE CAMELIO, DAVID Z. PAI, Institut PPRIME (CNRS UPR 3346, Universit de Poitiers) — In this work, we have studied the influence of a nanostructured surface (thin film of nanodiamond) on the plasma propagation of a surface dielectric barrier discharge (SDBD). The plasma is generated on the surface using positive nanosecond voltage pulses with a low repetition rate (10 Hz) in ambient air. The plasma is studied with fast ICCD imaging, time and space-resolved emission spectroscopy and current measurements. The surface is analyzed by Raman spectroscopy before and after plasma exposure. Single discharge events are visualized using a dedicated UV microscopy bench. Compared to a bulk material surface (glass) in the same operating conditions, it appears that the nanostructured surface has a strong influence on the plasma features. Instead of transient filaments more and less randomly distributed on the glass surface, the plasma on the nanostructured surface exhibits a well-defined symmetric ring pattern, without any filaments. The ring pattern gradually expands on the surface during the positive voltage pulse and demonstrates high pulse-to-pulse reproducibility and stability. This influence of the surface on the plasma features may offer potential perspectives for better control of the plasma generated in air at atmospheric pressure in a SDBD configuration.

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