SURFACE DIELECTRIC BARRIER DISCHARGE NON-THEMAL PLASMA ACTUATORS PRINTED WITH AEROSOL JET TECHNOLOGY

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ABSTRACT

Aerosol jet printing (AJP) has emerged as a promising method for microscale digital additive manufacturing using functional nanomaterial inks [1]. A hallmark of AJP, and a feature underlying its expanding use, is its versatility and compatibility with a broad range of materials, from organic semiconductors and carbon nanomaterials to functional ceramics and composites. The Aerosol Jet system provides the ability to print fine-feature electronic, structural, and biological patterns onto almost any surface, with feature sizes as small as 10μm. The printing process is non-contact and conformal with typical stand-off distances of some mm, allowing for patterning over existing structures and into open channels.

Surface dielectric barrier discharge (S-DBD) plasma actuators, on the other hand, are widely investigated for their ability to manipulate airflow [2-4]. Their main advantages are their very short response time and their low power consumption but they require accurate multi-layer electrode geometries for some manifestations.

The experimental applications of AJP to DBD plasma actuators, examined in this work, mainly consist of the thin film deposition of two different geometries of S-DBDS (linear and annular) actuators and their electrical characterization that include thin film resistivity via the Van der Pauw method, mobility of the ink used and charge carrier mobility.

KEYWORDS: aerosol jet printer, surface dielectric barrier discharge, non-thermal plasma, thin film deposition, surface dielectric barrier discharge.

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