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DEPO / Plasma - deposited coatings for optical, electronical and other functionalities

## **Effects of the operating parameters on aerosol-assisted atmospheric pressure plasma thin film deposition**

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### **Abstract content**

Non-thermal atmospheric pressure plasmas are used for a wide range of applications. Recently efforts have been made to couple an aerosol injection of liquid precursor(s) with atmospheric plasmas in order to elaborate thin films. The dispersion of liquid droplets and their interaction with the plasma and/or the post-discharge lead to different issues. In this study, a non-thermal atmospheric pressure plasma torch from AcXys Plasma Technologies is used. This process offers an easy and robust solution to generate low temperature post-discharge in air or nitrogen. It is suitable for thin film deposition on flat or 3D complex substrates for in-line production. The influence of discharge and process parameters (gas process, gas and precursor flow rates, discharge power, distance between nozzle and substrate ...) on the thin film properties are investigated. The shape and velocity of the droplets are obtained by rapid imaging the aerosol. Morphology and roughness of the coatings determined by Atomic Force Microscopy (AFM) are discussed as well as the images obtained from Scanning Electron Microscopy (SEM). The thin film properties can be tailored by both the aerosol characteristics and the plasma process parameters. Dense thin films or porous films with high roughness can be elaborated from the same precursor depending on the process parameters. The comprehension of these phenomena, through further investigation, can improve the optimization of aerosol-assisted plasma.

Keywords: thin film coating, aerosol, plasma deposition, aerosol-assisted atmospheric pressure plasma