Atmospheric pressure micro discharge current measurement and control

InnoPhysics B.V. is worldwide the sole supplier of the digital on-demand μPlasmaPrint™ hardware solutions that enables mask-less patterned surface activation, etching and deposition of functional coatings on thin plastic and glass substrates. The μPlasmaPrint™ solution can be used to improve ink wetting behaviour and/or to create hydrophobic/hydrophilic contrasts. In combination with inkjet or slot die coating μPlasmaPrint™ can be used to apply patterned thin uniform films for printed electronics applications. μPlasmaPrint™ is currently available as an equipment solution for R&D tabletop printing in combination with the Pixdro LP50 and as a stand alone μPlasmaPrint™ platform. Rapid prototyping, versioning and changing designs for printed electronics and biomedical and microfluidic sensor R&D will become faster and easier.

A major difficulty working with microdischarges at atmospheric pressures is measuring the plasma characteristics, in particular measuring the discharge current. InnoPhysics is looking for a student to setup current measurements of microdischarges generated with the μPlasmaPrint head. Next step is measuring the microdischarge current for a set of operating conditions. The results will need to be evaluated using an electrical circuit simulation already available at InnoPhysics. Ultimately the goal is regulate and control the current flow of the microdischarges. The student will be challenged to advise or come up with a solution to achieve microdischarge current control.
Silicon-oxide-like material deposition using micro discharges in atmospheric pressure

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Silicon-oxide –like materials deposition by means of plasma is a fairly common and well-known process. InnoPhysics would be able to deposited thin films of this material in patterns without using a mask and in atmospheric pressure conditions. We challenge a student to start depositing thin patterns of silicon-oxide-like material using μPlasmaPrint. The student will have to find a process operating window in terms of plasma settings and gas precursor flows for which material can be deposited. Analysis of the deposited films can be done by means of ellipsometry to measure film thickness and refractive index, infrared spectroscopy to determine the chemical composition and contact angle measurements to determine the hydrophobicity of the material. In addition these techniques can be employed to analyze and characterize the deposited patterns such as the resolution of the process in terms of line widths and line pitch. Thin lines with a hydrophobic nature will become important to assist in achieving higher resolutions in printed electronics devices.
Amine functionality printing using micro discharges in atmospheric pressure

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Amine functionality is used in biomedical sensor applications as a biocompatible immobilization for biomaterials such as proteins and enzymes. Achieving this functionality on plastic substrates would mean a significant cost reduction of next generation biosensors. The InnoPhysics µPlasmaPrint technology would be an ideal technology to apply amine functionality in patterns or on specific spots in a biosensor. It is however a major challenge to achieve sufficiently high amine functionality density on substrates by means of atmospheric plasmas. We are looking for a student to assist in the process development to achieve high amine functionality on glass and plastic substrates. Process development, optimization and analysis will be your task. Measuring amine functionality on a nanometer scale is a difficult task. The student is challenged to propose and setup the means to measure amine functionality. Demonstration of the measurement technique will be done on samples produced using the µPlasmaPrint technology.