

μPlasmaPrint: Digital on-demand surface engineering

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Atmospheric pressure micro-plasmas allow cost-effective area-selective surface modifications and chemical functionalization. Plasma patterning technologies are used in combination with inkjet printing or fluid dispensing and can be implemented in biosensor and tissue engineering applications. InnoPhysics has developed and commercializes the μPlasmaPrint technology, which utilizes a multineedle-to-plate dielectric barrier micro-discharge at atmospheric pressure and enables area-selective functionalization by means of a dot-wise patterning of the plasma treatment/deposition with a resolution from millimeters down to 150 μm.

Recently InnoPhysics has made significant changes on hardware and process options in order to enhance the μPlasmaPrint resolution and to improve the processing and substrates flexibility. Latest developments will be shown related to process characterization through surface wettability mapping, in-situ monitoring of the plasma energy for improved process

feedback and the development of a stand-alone μPlasmaPrint head with integrated electrode to enable the application of μPlasmaPrint not only on 2D, flat substrates, but also more complex, 3D workpieces. On the process side, developments will be presented to enable non-fouling hydrophilic coatings in plastic biomedical devices by combining μPlasmaPrint with liquid coating dispensing. Furthermore recent developments which enable selective chemistry to obtain patterns of chemically functionalized substrates as an alternative to direct μPlasmaPrint deposition will be shown. Examples will involve a direct, patterned plasma ALD-like approach to obtain microscale patterns of $\text{In}_2\text{O}_3:\text{H}$.

Speaker Biography

Bilel R is an entrepreneurial plasma physicist with strong background in plasma-surface interaction, surface engineering, and enabling cold atmospheric plasma technologies. He is currently principal researcher and leader of the R&D department of InnoPhysics, the company proprietary of the digital plasmaprint patented technology. He holds a PhD in Plasma Physics from Padua University, Italy

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