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# Local Deposition of Plasma-polymerized Gradient Films with Novel Porous Electrodes

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This contribution presents the area-selective deposition of plasma-polymerized films on insulating surfaces with concentration gradients of functional groups by plasma printing at atmospheric pressure using novel gas permeable electrodes as porous “plasma stamps”. These electrodes consist of a gas permeable sintered metal fleece of 5 mm thickness sealed on one side with metal foil and covered on the other side by a layer of structured PDMS of 240 µm thickness, carrying cylindrical vias with 500 µm diameter centred on a hexagonal lattice with 750 µm lattice constant. This configuration provides diffusive exchange of species between the in-plane gas flow through the porous metal and the discharge in the cavities, formed temporarily between the plasma stamp and the insulating substrate. Main advantage of the new electrode design is the possibility to feed it with two or more different gases from spatially separate locations. Thereby, a steady-state distribution of species concentrations within the gas flowing through the porous metal can be achieved, enabling the generation of spot arrays with controlled gradients of physicochemical surface properties, which may be used for combinatorial studies. Polyolefine foils were used as substrates for local deposition of plasma-polymerized films by exposure to arrays of microplasmas in carrier gases with suitable gradients of precursor concentrations. The deposited thin films were characterized by XPS and IR spectroscopy. Chemical derivatization with 4-trifluoromethyl-benzaldehyde followed by ATR-FTIR or SEM-EDX analyses was used to determine density distributions of primary amines within treated areas.

**Keywords**
microplasma
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area densities