

## **Cold atmospheric plasmas as a source of reactivity in plasma-substrate interaction studies**

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Atmospheric non-equilibrium plasmas are an effective source of large densities of reactive radicals, metastables, ions and high fluxes of photons with wavelength down to the 60 nm. The resulting high reactivity of these plasmas is due to combination of several or all of these components, very often in a synergistic way, during the treatment and can be used in many applications such as activation of polymer surfaces, treatment of living tissues (decontamination, acceleration of wound healing) or liquids, or in deposition of thin films or nanostructured materials. However, the complexity of plasma-chemical processes in the discharge requires combined experimental and theoretical approach in plasma analysis, where quantitative and qualitative plasma diagnostics are compared with theoretical plasma simulations. Additionally, the study of isolated or combined effects of the plasma components requires specially designed plasma sources. In this contribution, the mass spectrometry for detection of neutral and ionized species and the windowless VUV spectroscopy for the plasma analysis will be discussed in details, followed by the discussion of plasma source design for separation of different plasma components. The experimental results serve for validation of plasma-chemistry models and rate-equation calculations, which can provide deeper insight into the whole atmospheric plasma process. Several examples of plasma the study of plasma-chemical processes and investigation of plasma-surface interactions will be discussed.