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## Organic and inorganic mass spectrometry as a helpful tool for bio-and-environmental sensors design optimization

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Time-of-flight secondary ion mass spectrometry (TOF-SIMS) has been proven as a powerful tool for detailed information on polymer composition due to its high sensitivity, high dynamic range, specificity and selectivity. TOF-SIMS can provide information about oligomer distributions, average molecular weights, fingerprint patterns for polymer identification, monomeric unit sequences, branching, cross-linking substitution, copolymer structures and additives or impurities. However, major challenges, viz. distinguish the surface from the rest of the material, unresolvable isobaric interferences regardless of the geometry of high-resolution instruments still remain unsolved. Herein, we will introduce an alternative strategy utilizing liquid chromatography-electrospray ionization-tandem mass spectrometry (Q-TOF LC-MS), head space gas chromatography (HS-GC-MS) and high resolution inductively coupled plasma mass spectrometry (HR-ICP-MS) to study the polymer stability and degradation mechanisms. The examples discussed will provide an overview of using HR-ICP-MS and Q-TOF LC-MS to glucose biosensor design optimization, viz. multi-layer biosensor stability and to identify critical system parameters that affect the biosensor response. In addition, we will demonstrate how HS-GC-MS technique might be used to set an optimal bulk poly(dimethylsiloxane) (PDMS) sensor including thickness and cross-linking ratio as well as sampling/loading approaches aiming an application to fragrance controlled release maintained the constant ratio of volatile compounds. We believe, the reported strategy, will allow mapping the influence of the complete set of system input parameters on the sensor response, which subsequently opens up the possibilities for optimization of the design of sensors and their performance.

### Biography

Yuliya E Silina has completed her PhD in Analytical Chemistry in Russia. Currently, she is a Principal Researcher of a team focusing on developments in the modern mass spectrometry, lab-on-a-chip devices, bio- and environmental sensing at Leibniz Institute for New Materials, Germany. She has published more than 30 papers in reputed journals and holds 11 patents for her inventions.

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