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**SOLID PHASE MICROEXTRACTION: QUO VADIS?**

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The talk will cover sampling/sample preparation devices developed in my laboratories which facilitate practice of “Green” analytical chemistry. Focus of the presentation will be on recent developments of new morphologies of extracting materials and novel sampling configurations as well as approaches compatible with high throughput lab and/or on-site determinations. The recent development of matrix compatible Solid Phase Microextraction (SPME) coatings lead to interesting features experienced during extraction, some of them not anticipated. They are not limited to elimination of fouling and saturation effects during direct extraction of complex samples, but also balance coverage property, enabling “via free form” clean extraction of small molecules widely varying in physical properties leading to some interesting applications. For example, on-site sampling, in-vivo metabolomics, and rapid screening via direct coupling of sample preparation to mass spectrometry were facilitated by this development. Food, pharmaceutical, clinical and medical application of this chemical biopsy tool for in-vivo monitoring and rapid diagnosis will be emphasized.

Different geometries of SPME will be discussed. One of the more recent approaches developed is thin film solid phase microextraction (TF-SPME). It has been designed for both laboratory and on-site deployment of integrated sampling/enrichment approach at the same time having large sorbent volume forming thin and high surface area coating and therefore facilitating rapid extraction. Various support geometries can be coated with the thin films which is the most appropriate for given application. The practical and fundamental advantages of the SPME technology in aquatic and air sampling investigations will be discussed and demonstrated on practical examples. Both spot and time-weighted average sampling are performed using this approach to investigate presence of relevant compounds present in aqueous media and air. The unique features of the microextraction technique facilitate its application for determination of the distribution and characterization of target analytes in real samples not only in laboratory, but also on-site and in-vivo measurements. Number of interesting on-site applications including direct underwater sampling with remotely operated vehicles (ROVs) and sampling and transport of the devices via drones.

**References**

[1] Reyes-Garceś, N., Gionfriddo, E., Gómez-Ríos, G., Alam, N., Boyaci, E., Bojko, B., Singh, V., Grandy and Pawliszyn J. *Advances in Solid Phase Microextraction and Perspective on Future Directions Anal. Chem.* 2018 90, 302-360.