

RECENT ADVANCES OF SORBENT-BASED MICROEXTRACTION TECHNIQUES IN BIOANALYSIS

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Abstract

Over the last decades, the development of sample preparation techniques for bioanalytical purposes has become challenging due to the need to continuously accomplish higher sensitivity, accuracy, and sampling throughput. Due to the matrix complexity of biological fluids, several steps are typically required to clean-up the samples and convert them to a “compatible” form appropriate for analysis.

Traditional sample preparation techniques involve solid-phase extraction (SPE), liquid-liquid extraction (LLE) that they suffer from several limitations including the high solvent consumption and waste generation, toxic organic solvents, long processing times and laborious routine. To overcome their sustainability weaknesses, microextraction techniques have been introduced and attracted much attention from many researchers in the last years. Many of them are compliant with the principles of Green Analytical Chemistry.

Apart from others, sorbent-based microextraction techniques take advantage of material science technology to prepare “smart” and task-specific sorbents. They can be miniaturized and considerably reduce the organic solvent consumption during the extraction process [1,2]. Typical examples involve solid phase microextraction (SPME), micro-solid phase extraction (μ SPE), stir-bar sorptive extraction (SBSE), microextraction by packed sorbent (MEPS), fabric phase sorptive extraction (FPSE), paper-based sorptive extraction, capsule phase microextraction (CPME), etc. The current presentation will be focused on the above techniques describing their potentials and limitations. Some presentative bioanalytical applications will be also presented.

References

- [1] E.V.S. Maciel, A.L. de Toffoli, E.S. Neto, C.E.D. Nazario, F.M. Lanças, New materials in sample preparation: Recent advances and future trends, *TrAC - Trends in Analytical Chemistry*. 119 (2019). <https://doi.org/10.1016/J.TRAC.2019.115633>.
- [2] N. Li, T. Zhang, G. Chen, J. Xu, G. Ouyang, F. Zhu, Recent advances in sample preparation techniques for quantitative detection of pharmaceuticals in biological samples, *TrAC Trends in Analytical Chemistry*. 142 (2021) 116318. <https://doi.org/10.1016/J.TRAC.2021.116318>.