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NANOCONFINED ARRAY LIQUID-SOLID MICROEXTRACTION BASED ON CARBON NANOFIBERS

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Among different existing extraction methods, microextraction techniques (METs) are considered nowadays very interesting due to their innovative characteristics[1–3]. Their use in fact allows different benefits, such as a minimum (or null) use of organic solvents, one-step sampling, preconcentration and clean-up procedure, simple operation, on-site derivatization, suitability for on-site, in-site and in-vivo determinations, and easy hyphenation with existing analytical techniques. An impressive number of METs have been set up, especially in the last five years[4]: they can be subdivided in two categories, namely "sample stir" and "flow-through" METs[5]. Solid phase microextraction (SPME) belongs to "sample stir" category and it is the first and still one of the most used MET. New sorbent materials have been employed in order to satisfy different requirements, i.e. specificity, biocompatibility, high recoveries, fast equilibrium time, high sensitivity or reproducibility, reusability, and high anti-fouling properties[5–9]. The type of coating used in the SPME fiber plays then a crucial role in the extraction and desorption processes, since their efficiency will depend on the distribution constant between the analytes and the stationary phase, and then fiber selectivity towards specific analytes in complex matrices. In this work, an innovative and versatile microextraction technique, based on solvent entrapment in carbon nanofibers pores, has been conceived, realised and optimised. The choice of the nanoconfined solvent (NCS) confers to this device a high versatility: it can extract polar, medium polar and/or nonpolar substances from complex matrices. The so-called nanoconfined array liquid-solid microextraction (NALSM) showed excellent extraction recoveries, short extraction time (1 min), high reliability, versatility, and reusability. Carbon nanofibers have been inserted in an umbrella-type device that guarantees a safe insertion in real samples, and the creation of a constant volume liquid zone, that allows on-site, in-site and in-vivo extraction. Due to its versatility, chemical stability and mechanical flexibility, NALSM can be considered a powerful candidate for high-throughput analyses from in-vivo biological samples.

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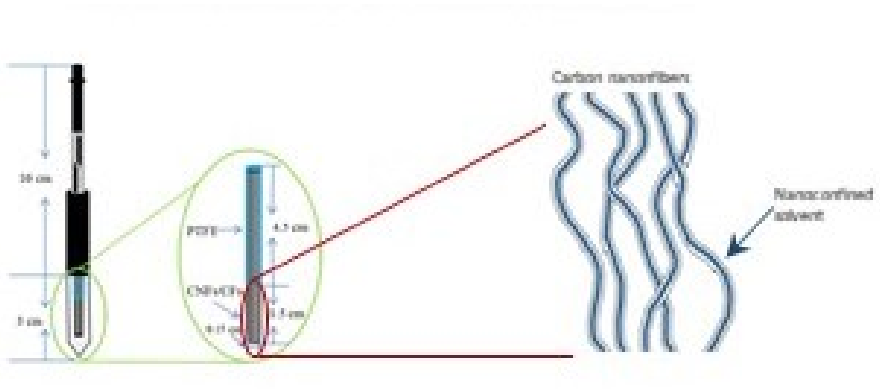

Figure 1. Nanoconfined array liquid-solid microextraction device

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