



## Ref. OTRI

201118R-Moliner, Y

## Knowledge Area

Analytical Chemistry  
Chemical Instrumentation

## Collaboration

Technology available for licensing  
Other collaborations may be considered

## Intellectual Property Rights

Patent rights

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## Magnetic In-Tube Solid Phase Microextraction

**Inventors:** Yolanda Moliner, Pilar Campíns, Eugenio Coronado, Helena Prima and Antonio Ribera (Universitat de València)

**Background:** In-tube solid phase microextraction (IT-SPME) is a well known sample preparation technique for its coupling with analytical instruments, like capillary liquid chromatography. In this technique, extraction, desorption and injection can be performed automatically, shortening the analysis time and improving precision. Notwithstanding, IT-SPME has revealed disadvantages such as the low extraction efficiency (10%-30%) due to large breakthrough volume and small amount of adsorbent phases.

**The invention:** Researchers from Universitat de València have designed a new IT-SPME on the basis of magnetic microfluidic principles improving extraction efficiency of conventional IT-SPME systems. The new system called **Magnetic-IT-SPME** allows quantitative extraction efficiency using magnetic hybrid materials as adsorbent phase into capillary columns and applying external magnetic fields.

The device uses a SiO<sub>2</sub> supported Fe<sub>3</sub>O<sub>4</sub> magnetic nanoparticles hybrid material immobilized in the internal surface of a bared fused silica capillary column to obtain a magnetic adsorbent extraction phase. The capillary column is placed inside a magnetic coil that allows the application of variable magnetic field. The application of a controlled magnetic field results in quantitative extraction efficiencies of the target analytes.

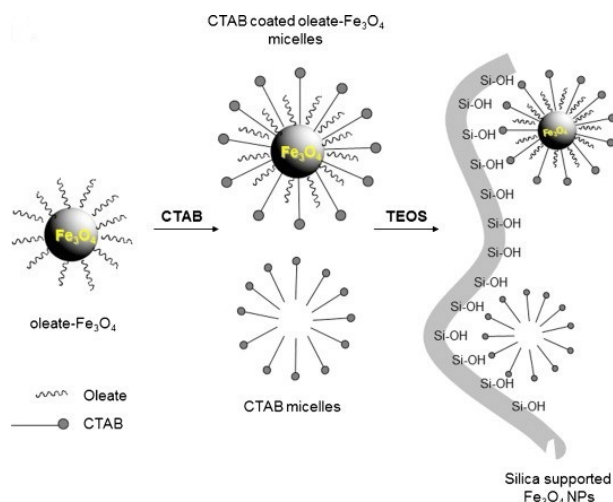
The new device has been successfully validated with several target analytes such as acetylsalicylic acid, acetaminophen, atenolol, diclofenac and ibuprofen.

**Applications:** This analytical instrument is useful for all those sectors that require high sensitivity of analyte quantification, particularly for organic compounds. For example:

- Environmental industry
- Pharmaceutical industry
- Food industry
- Biochemistry
- Medical chemistry
- Industrial chemistry

**Advantages:** The device has the following advantages over existing equipment:

- Allows quantitative extraction efficiency, solving one of the main drawbacks of IT-SPME systems
- Broadens applicability of IT-SPME thus making available its advantages (automation, precision) to specific analyses that require high sensitivity of analytes estimation.



*Schematic illustration of the proposed magnetic sorbent*