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Tuesday 11th November 2014, 10.00 – 12.00, A14, seminary room K207:
Femtosecond Laser ablation/ICPMS for trace element and isotope ratio measurement: application to biomineral, petroleum industry and forensic science.

Recent advances in laser physics, more precisely in the field of ultrashort pulses (femtoseconds), have motivated the use of compact, robust and high repetition rate femtosecond laser sources. Many industrial or research fields have been able to benefit (micromachining, microscopy, etc…) and particularly analytical chemistry for trace (ug/g) or ultra-trace (<ug/g) quantification in solids at the micron scale. Original approaches based on the use of high repetition rate (<100 kHz) femtosecond lasers have been developed; they combine the intrinsic properties of fs pulses (very limited thermal ablation, sometimes called "cold" ablation, and generation of thin particles easily atomised into the ICP) with the fast movement of the laser beam at the surface of the sample using two galvanometric scanners. This leads to "virtual beam shaping", that allows simulating various beam shapes for better spatial resolution, sensitivity and precision. It is then possible to adapt the size and the shape of the laser beam to match perfectly with the sample morphology. This approach has been applied to trace metal detection in micro-structured biocarbonates (fish otolith, scallop shells), in crude oils, pure metals, glasses, polymers and environmental micro-particles. In this course, we will present the concept of virtual beam shaping and some associated applications.

Thursday 13th November 2014, 14.00 – 16.00, A11, lecture room132:
Inorganic analytical chemistry in 5 dimensions: concentration, isotopes, speciation, spatial resolution, time resolution and the way to combine all of them; some developments in LA in proteomics.

Inorganic analytical chemistry is generally focussed on elemental concentration, isotopic distribution, molecular information, spatial resolution or spatial resolution. These parameters constitute the 5 dimensions of the inorganic analytical chemistry and are very often considered individually. In this course, we will see how to combine trace element concentration and molecular information, molecular information with isotope distribution, concentration with isotope and spatial resolution, concentration with spatial resolution and molecular information… and of course time resolution! This approach relies on the combination of various techniques for sampling, sample preparation, chemical separation and isotope detection.

Thursday 13th November 2014, 16.00 – 17.00, A11, lecture room132:
Trace element determination by atomic spectrometry techniques.

Recent advances in atomic spectrometry allows considering original applications. Some techniques considered as mature (or dead!) like GF/AAS might now relive due

to the combination of graphite furnace with continuum light source and high spectral resolution spectrometer. Inductively Coupled Plasma Mass Spectrometry has also received a great interest in the last decade with the arising of new mass spectrometer geometries: right angle ion beam deflection, Mattauch Herzog geometry, Jet interface HR-ICPMS. In this course, we will present this innovative instrumentation.