

Seminario tractor 7 (ST7) – Análisis de contaminantes y remediación ambiental

Salón de actos de iMATUS, 22 de junio de 2023

Hora: 16.00 a 18:00 h

PROGRAMA

16:00-16:20 *Pilar Bermejo Barrera*

ICP-MS as a powerful tool for the study of metal nanoparticles in complex samples

Due to the fast expansion of the consumer products that contain ENM, there is a concern about their potential risks. Today there is no problem to perform the metal NPs characterization. But, in order to obtain quantitative information in complex samples it is necessary the use of analytical techniques with atomic detectors. Nevertheless, many of these techniques can not differentiate between dissolved species and NPs. The use of the ICP-MS in the mode single particle, SP-ICP-MS, is a promising technique for the analysis of complex samples that contain metal NPs and the ionic form, without a previous separation step. On the other hand, the metal content and/or the metal NP in an individual cell can offer an insight to understand their uptake and elimination mechanisms. The single cell mode, SC-ICP-MS, can be a powerful and versatile analytical tool for quantifying dissolved metals and metal NPs inside cells. Some applications of both techniques for the analysis of TiO₂NPs and AgNPs will be presented.

16:20-16:40 *Antonio Moreda Piñeiro*

Use of nanomaterials to develop sensors and their applications to the environment.

Semiconductor colloidal nanocrystals known as quantum dots (QDs) are widely used as fluorescence probes because they require simple instrumentation and offer many advantages, such as low cost, ultrasensitivity, and rapid analysis. But, the main limitation of these sensor phases is the low selectivity towards the target analyte. Molecular/Ionic Imprinted Polymers (MIP/IIP) are excellent materials for providing selectivity for the molecule/ion used as a template during the polymerization process. Thus, chemosensors based on QD-MIP/IIP can be selective and sensitive detection probes for rapid and low-cost determinations. This presentation provides an overview of our findings in relation to the development of Mn-ZnS QD-MIP/IIP-based sensor probes to assess/determine different analytes in widely diverse samples, such as cocaine and metabolites (benzoylecgonine and methyl ester of ecgonine) in forensic samples (urine, serum and oral fluid), aflatoxins (AFB₁, AFB₂, AFG₁ and AFG₂) in food (vegetable beverages) and feed, and inorganic arsenic (As(III) and As(V)) and mercury total in fishery products.

16:40-17:00 *Yolanda Piñeiro Redondo*

Nanostructured biomaterials for water cleaning waters

Human activities, climate change, overexploitation of resources and pollution are directly affecting the quality and availability of water. The types of contaminants present in drinking water reservoirs have a variable pattern over time, an irregular distribution depending on the area, and a highly variable chemical profile (toxins, heavy metals, drugs, fluorinated compounds, nanoplastics, etc.). Many of these contaminants are not removed by conventional treatments in water management plants and, for this reason, the use of biomaterials functionalized with magnetic nanoparticles represent an opportunity for the efficient adsorption of different types of molecular species in a renewable manner with low cost and easy implementation in existing systems.

17:00-17:20 *Carlos Vázquez Vázquez*

Fotodegradación de microcontaminantes using subnanometric clusters

Micropollutants consist of many natural and anthropogenic substances, present in trace concentrations, mainly in wastewater. These pollutants suppose a risk to health and the environment and are difficult to eliminate by conventional treatments. Photodegradation using classic photocatalysts, such as TiO₂, have the drawback that they only absorb in the UV region and have very low efficiencies due to rapid electron-hole recombination. However, the addition of atomic quantum clusters (AQC) has proved capable of modifying TiO₂ bandgap, resulting in enhanced light absorption and a reduction effect on the recombination rate of electron-hole pairs. SnO₂/TiO₂ hybrid nanomaterials have been synthesized and silver clusters have been deposited by incipient wetness impregnation. After characterization of the samples, their photocatalytic activity was studied in the photodegradation of some micropollutants in water using a solar simulator. Methylene blue was selected as dye model and ibuprofen as emerging pharmaceutical micropollutant in municipal wastewater.

Co-organizados por la Unidad de investigación y la Unidad de extensión, formación especializada y divulgación

17:20-17:30 Juan José Lopéz Mayán

Silver and titanium dioxide nanoparticles determination in aquaculture products by SP-ICP-MS

Silver and titanium dioxide nanoparticles are widely used in industry, can be emitted into the environment, interact with different organisms, and therefore can be considered emergent contaminants. Thus, this talk focused on the bioaccumulation and bioavailability studies of these inorganic nanoparticles in some of the most important aquaculture species of the Atlantic area, including mussels, turbot, and seaweed. For that, single-particle inductively coupled plasma-mass spectrometry was the main analytical technique used for nanoparticle quantification.

17:30-17:40 Iván Lozano Gonzalez

Determination of inorganic nanoparticles using a labmade Hydrodynamic Cromatography HDC- ICP-MS

Inorganic nanoparticles (NPs) are on the focus of the scientific community since their unique properties such a large surface area, mechanical resistance, optical activity, and chemical reactivity. The extensive use of NPs concerns the scientific community due to their potential toxicity and their presence in several compartments of the environ-ment. In this thesis, we will try to develop an analytical method based on the separation by hydrodynamic chromatography with inductively coupled plasma-mass spectrometry. In the first analysis, silver nanoparticles were fractionated and detected by on-line and off-line mode. After that, other nanoparticles such as copper, zinc and gold were analysed. All this analysis were made using a labmade column based on silica.

17:40-18:00 Mesa Redonda