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| **Title** | Methods and materials for environmental management |
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| **Research Group** | Analytical Chemistry – DiSC |
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**Project description:**

Environmental contamination poses significant risks to ecosystems and human health. In this project, we propose an integrated framework leveraging advanced analytical techniques, chemometric analysis, big data analytics, and smart materials synthesis for the detection and remediation of organic and inorganic contaminants across various environmental compartments.

High-performance analytical instruments, particularly mass spectrometry (MS), will be utilized for their sensitivity and selectivity in identifying target and non-target contaminants. This holistic approach provides a comprehensive understanding of contamination patterns and sources.

Chemometric and metabolomic approaches will be employed to analyze the complex datasets generated from environmental samples. In parallel, the project focuses on the smart materials, such as nanomaterials and adsorbents for environmental remediation purposes.

**Objective/Skills:** analytical method development and validation; identification of target and non-target contaminants in environmental compartments (water, soil, plants, food) by instrumental analysis based on MS; chemometric and metabolomic approaches; elements of risk assessment; synthesis, characterization and evaluation of smart materials for environmental remediation;

**Publications**:

1. *Metallic functionalization of magnetic nanoparticles enhances the selective removal of glyphosate, AMPA, and glufosinate from surface water.* Environ. Sci. Nano **2023** *10*, 2399-2411. DOI: https://doi.org/10.1039/d3en00129f.
2. *Design and experimental validation of an optimized microalgae-bacteria consortium for the bioremediation of glyphosate in continuous photobioreactors.* J. Hazard. Mater. **2023**, 441, 129921. DOI: https://doi.org/10.1016/j.jhazmat.2022.129921.
3. *Ecotoxicological effects and bioaccumulation of BPA analogues and their mixture in the clam Ruditapes philippinarum*. Mar. Environ. Res. **2023** 192, 106228. DOI: https://doi.org/10.1016/j.marenvres.2023.106228.
4. *New insights in the slow ligand exchange reaction between Cr(III)-EDTA and Fe(III), and direct analysis of free and complexed EDTA in tannery wastewaters by Liquid Chromatography - tandem Mass Spectrometry.* Chemosphere **2021**, 264 (1) 128487. DOI: https://doi.org/10.1016/j.chemosphere.2020.128487.

**Collaborations/Network:**

Departments of Biology, Engineering, Pharmaceutical Sciences of the University of Padua; Italian National Health Institute; Italian Water suppliers.

**Research funding:**

Research contract by Italian National Health Institute, Perfetti Van Melle, Italiana Biotecnologie, Unismart