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WATER/WASTEWATER MONITORING & THE DEVELOPMENT OF ADVANCED TREATMENT TECHNOLOGIES WITH FOCUS ON MICROPOLLUTANTS-RIO DE JANEIRO, BRAZIL

Marcia Marques
Department of Sanitary and Environmental Engineering, Rio de Janeiro State University - UERJ, Brazil.

Abstract
The *Laboratory of Bioremediation, Phytotechnologies and Innovation in Water and Wastewater Treatment* (LABIFI), Department of Sanitary and Environmental Engineering, Rio de Janeiro State University (UERJ) was created in 2008 and since then, its infrastructure and analytical capacity been expanded, followed by continuous training of the technical staff and post-graduation students. Different areas of scientific investigation carried out by professors, doctors, PhD candidates and MSc students at LABIFI have the main focus on micropollutants of increasing concern (MPs) such as pharmaceuticals and personal care products, including detection in aqueous matrices (drinking water, wastewater, surface water), human health and ecological risk assessment associated to MPs and the development of advanced water and wastewater treatment technologies for MPs removal. Research has been conducted in the following areas: (1) Development and validation of analytical methods and tools, including: (1a) more sustainable methods for sample extraction/ preparation for chromatography (e.g.: micro-extraction liquid-liquid dispersive-MELLD) reducing the volume of hazardous solvents and preventing the use of cartridges (avoiding solid waste generation, reducing costs); (1b) development and validation of analytical methods for the detection and quantification of MPs by liquid chromatography/mass spectrometry; (2) Environmental monitoring of strategic hydrographic basins/drinking water and Ecological Risk Assessment (ERA) of urban aquatic ecosystems including chemical, ecotoxicological and ecological lines of evidence (LoE); (3) Water and wastewater treatability studies, including: (3a) advanced biological processes with multistage hybrid reactors, (3b) decentralized wastewater treatment plants (constructed wetlands), (3c) phycoremediation (the use of microalgae for wastewater treatment), (3d) adsorption processes with the development of biomaterial-based new adsorbents, (3e) advance oxidation processes, including ozonation and heterogeneous photocatalysis; (4) Development of new composite/nanocomposite materials with both sorptive-photocatalytic properties. The main objective with the environmental monitoring and risk assessments is to supply decision makers with useful information to prevent impacts to the environment and human health. The goal with the development of advanced treatment techniques is to offer feasible and sustainable technological options for the removal of MPs from both drinking water and aquatic ecosystems.

Keywords: micropollutants; water monitoring; biological treatment; adsorption; photocatalysis

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