COMBINED ADVANCED WASTEWATER TREATMENT PROCESSES FOR PERSISTENT ORGANIC POLLUTANTS REMOVAL AND ENHANCEMENT OF WASTEWATER BIODEGRADABILITY

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The primary objective of this project is to study some advanced wastewater treatment processes considering efficient elimination of persistent organic pollutants from effluents and the increase effluent biodegradability. Thus, different advanced treatment processes could be coupled before or after the biological treatment step to enhance the removal efficiency and to increase the number of recycling / reuse applications of municipal and industrial wastewaters.

Thus, the project proposes the following **scientific specific objectives**:

1. Laboratory scale studies of advanced wastewater processes to eliminate persistent organic pollutants from effluents. This objective envisages the development of fundamental research activities on 3 types of advanced processes: **ultrafiltration, adsorption on surfactant modified zeolites and wet catalytic peroxide oxidation** in order to determine the individual POPs removal performance of these processes.

2. Laboratory scale studies on combinations of advanced wastewater treatment processes to improve the elimination of persistent organic pollutants from wastewaters. The fundamental research activities associated to this objective are designed to investigate the way in which by combining individual advanced wastewater processes, as well as their logical sequences influence the individual and overall performances of POPs elimination processes.

3. Study of advanced treatment processes influence on the biological treatment processes for the removal of persistent organic pollutants. The project proposes to investigate the way in which the three types of advanced processes previously studied can contribute to the improvement of the biological treatment performances by coupling them either before the biological step (to increase the biodegradability of the influent and to protect the microbial flora), or after the biological step to eliminate organic pollutants that remain untreated in the biological step.

4. Mathematical modelling and simulation of the evolution of the studied processes in different initial process conditions to enlarge the applicability of these processes.

Besides these novel and original scientific objectives, the project also proposes the realization of the following associated objectives:

1. Dissemination of the relevant scientific results on a national and international level through the publication of 6 articles in ISI ranked journals or in international peer-reviewed journals;
2. Improvement of the scientific capacities of researchers, especially of the younger members of the team through research mobilities;
3. Improvement of scientific competences of younger team members by finalizing and defending 2 doctoral theses;
4. Improvement of the national and international visibility.

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