# BIOSACC

## BIOSORPTION AND BIOACCUMULATION IN THE BIOREMEDIATION OF ENVIRONMENTAL COMPARTMENTS CONTAMINATED WITH PERSISTENT POLLUTANTS

**Research Grant no. 265/05.10.2011 of IDEI PROGRAMME PN-II-ID-PCE-2011-3-0559**

The call emphasizes the need to support and promote fundamental, interdisciplinary and/or exploratory scientific research in Romania so as to assert the international excellence and visibility of scientific research, and to identify and support internationally competitive teams for research and development. In this context, BIOSACC aims to conduct research for the purposes of acquiring advanced knowledge in the field of bioremediation of environmental compartments (air, water, soil) contaminated with persistent pollutants, and offering cost-effective and environmentally friendly technological alternatives to common non-biological approaches. Together with pollution prevention and detection, the elimination of a wide range of pollutants from waters and soils is an absolute requirement for sustainable development. The basis of the proposed research is represented by biosorption and bioaccumulation, which in the present context is the use of non-living and living biomass to reduce pollutant concentration or remove contaminants from environmental compartments, in particular from aqueous solutions (contaminated drinking water and treated wastewater effluents).

***Project objectives***

*Fundamental objective of the project*

As an overall objective, BIOSACC will enhance the contribution of environmental biotechnology in the bioremediation of contaminated environmental compartments and improve treatment strategies of water resources and aqueous effluents beyond the state of the art. BIOSACC will exploit the biosorption and/or bioaccumulation potential of non-living and living biomass to remove persistent pollutants from aqueous solutions with various concentrations and thereby to meet the EU quality criteria.

*The following specific objectives have been established to meet the overall objective:*

(i) Screening of leading bioremedial processes and adequate regulations and benchmarking, in order to define target values of the intended processes and technologies, target contaminants, biosorbents and bioaccumulators, together with establishing the configuration and scale of the treatment system/bioreactor;

(ii) Studies on the biosorption and bioaccumulation of some heavy metals and persistent organic pollutants under various experimental conditions, data evaluation and analysis, modeling the processes, application of new chemical and microbiological tools for exploring the processes;

(iii) Enhance the removal efficiency by developing novel adsorbents and bioaccumulators, find the optimal combination of biosorbent/contaminant/process parameters to form an integrated approach applicable to various water treatment and bioremediation processes;

(iv) Provide a rapid cost-effective routine with reliable monitoring opportunities for enhancing the effectiveness and improving the predictability and reliability;

(v) Scale-up of laboratory processes at bench scale and simulation of applicability at large scale, provide technical prototypes and know-how for biotreatment;

(vi) Integrated assessment and performance validation through cost/benefit analysis, Life Cycle Assessment and risk evaluation, large dissemination of the results.

***Project description/activities***

The project is structured in 7 well-integrated work packages (WPs). The work plan consists of two main parts: (i) the scientific work and the technological development will be performed within WP2-WP6. WP3-WP4 aim at exploring the "black box" of biosorption and bioaccumulation, providing in-depth knowledge about mechanisms, kinetic and thermodynamic issues, relations between biomass growing and sorbate binding, various metabolic processes. (ii) This RTD-module will be handled by the project management (WP1) and dissemination (WP7) (Pert Diagram, Fig. 1)

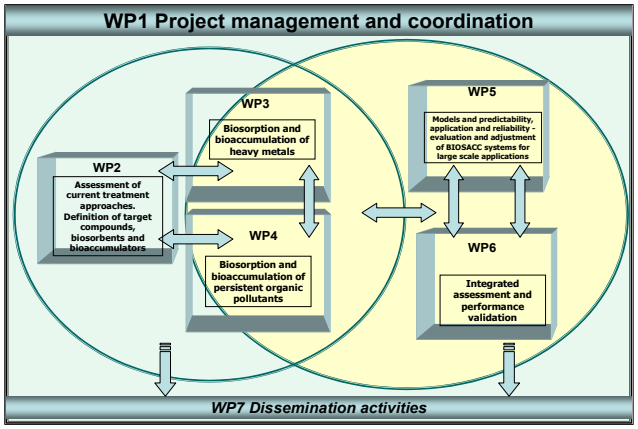


**Fig. 1.** Graphic presentation of the project structure

*For more information on the BIOSACC Project please visit: http://biosacc.xhost.ro/.*

*Project Director*
***Professor Maria Gavrilescu, PhD***
*Department of Environmental Engineering and Management*
*"Gheorghe Asachi" Technical University of Iasi, Romania*
*mgav@ch.tuiasi.ro*