

AERL / LCAM

Advanced Environmental Research Laboratories

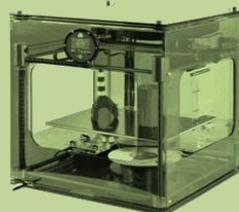
Research Groups & Research Fields



AERL's goal is to promote research and teaching in the area of chemistry and biology and related fields like environmental chemistry, analytical chemistry, microbiology, bioinformatics, molecular biology, etc.



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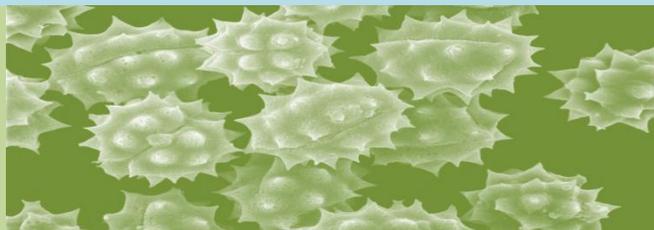
Advanced Computational Chemistry (Biophysics & Bioinformatics)

3D printing of bioplastics
Applications of computational chemistry methods in determining the structure, properties and reactivity of small to middle size molecules
Computational biochemistry for establishing the ADMNE-Tox properties of molecules with potential therapeutic action



Advanced Materials with Tailored Properties

Adhesion and adhesives (medicine, aeronautics, footwear)
BioMimetic materials
Environmental functional materials
The synthesis and the structural characterization of the polyurethanes

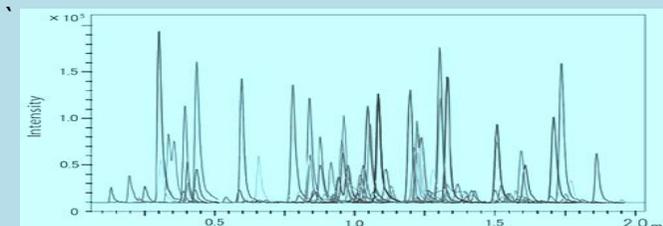


Aerobiology, Bioindicators & Invasive Species

Aerobiology: pollen and fungal spores role in triggering allergic diseases
Chemical communication in plants
Molecular pathogen-host interaction
Plant evolutionary and physiological applications to invasive species, plants-at-risk and agricultural species

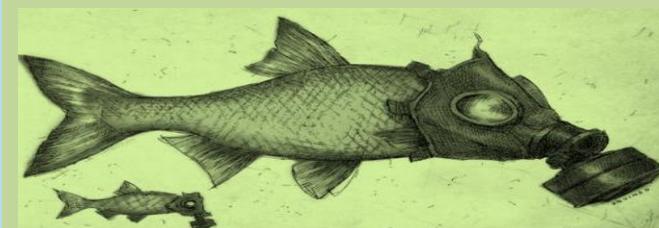
Analytical Biochemistry & Chromatographic Separations

Combining advanced analytical chemistry, signal processing, and statistical modeling into chemical fingerprinting and metabolomics
Determination and control of organic pollutants in environmental samples (water, air, soils) and biological samples, using new extraction techniques



Ecotoxicology

Developing and evaluating methods to assess the potential risks of organic chemicals to humans and the environment
Fate transport and food web bioaccumulation modeling
Human exposure to xenobiotics and health assessment
Phase I and phase II drug metabolizing enzymes



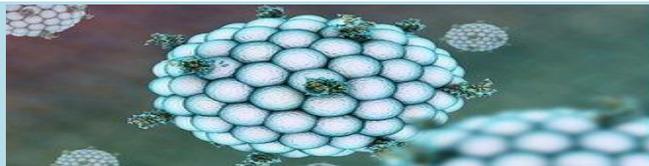
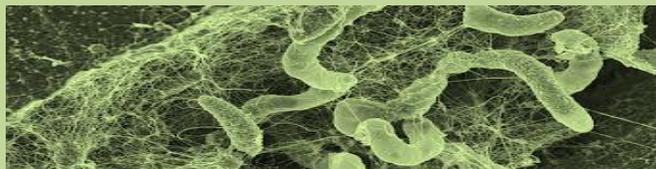
Environmental Electrochemistry

Chitin/chitosan derivatives for corrosion protection and waste water treatments
Electrochemistry (coagulation, oxidation, reduction, Fenton, disinfection) for water and wastewater treatment
Hybrid and heterogeneous catalysts.
Photocatalytic process for the removal of organic compounds



Environmental Microbiology & Soil Quality

Determining the behaviour of organic contaminants (e.g. pesticides), metals & nutrients in soils and soil/plant systems
Pioneering studies on bacterial metabolism/decontamination of pesticide wastes in continuous culture and in soils



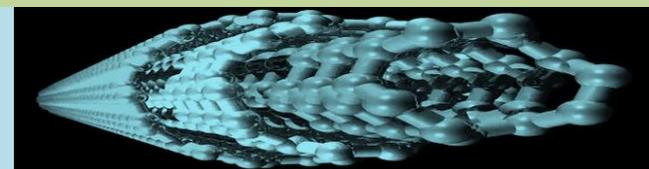
Inorganic Advanced Materials and Environment

Application of mono- and bimetallic nanoparticles for the degradation of organic pollutants
Composite materials



Molecular Biochemistry

Accelerated evolution techniques to obtain proteins with predefined properties
Carbohydrate-active enzyme discovery from plant and microbial species via genomics, metagenomics and bioinformatics as target enzymes for biochemical characterization



Functional Nanostructured Materials

Bioplastics made from chitin, cellulose and other plant-based polysaccharide materials
Chitosan and its derivatives for wound healing: in vivo and in vitro studies



Natural Compounds, Biodiversity and Drug Discovery

❖ Bioprospecting Romanian flora with a view towards identifying hits on a broad spectrum of biological activities (antiparasitic, antibacterial, anticancer); selecting promising hits, leading to organic synthesis and structure-activity relationship studies; using structure and ligand-based drug design approaches to guide hit-to-lead optimization

Renewable Energy Sources

Chitin and chitosan use as adsorbent of toxic contaminating metals
Bioplastics made from chitin, cellulose and other plant-based polysaccharide materials
Applications of chitosan beads for adsorption of metal ions



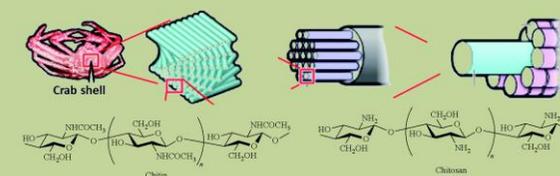
Sustainable Technologies for Environment Remediation

Chemical, biological, and physical countermeasures for oil and chemical spills and for cleaning up contaminated sites
Solid waste pollution control and recycling – Solid waste management



Bio-garbage recycling

Chitin purification starting from waste materials (sea food garbage)
Deacetylation of chitin to produce chitosan using an environmentally friendly method
Derivatization of chitosan to produce valuable end-products



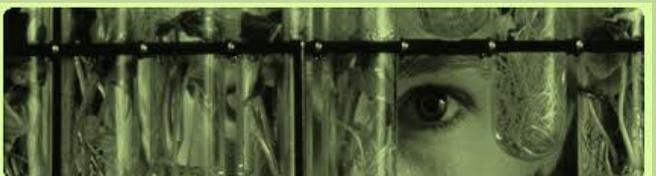
Environmental Monitoring and Analysis Technology / Water & Air Quality

Air pollution prevention and control technologies
Measurement of emissions from stationary and mobile sources
Water pollution prevention technology and water reuse.



Evolutionary Biology and Ecology & Plant Pathology

Applied biodiversity of aquatic systems
Examining the interaction of environmental stressors (e.g. extreme temperatures, UV light, carbon dioxide, ozone) on vegetation & algal communities



Green Organic Chemistry & Chemical Fate

Active biocatalysts by immobilization using sol-gel technology
Drug release systems based on silica and biopolymers molecules that bind to proteins and that help us to decipher the function of specific proteins in complex cellular processes or to measure the action of proteins in real time (chemical biology).



Recombinant DNA technology products

Bacterial and yeasts genes modifications to produce proteins with tailored properties
Metabolic engineering of bacteria and yeasts to produce biopolymers starting from waste materials

