Cyprus University of Technology | Studies and Student Welfare Services

Doctoral Vacancy Announcement form

Research Topic Title: Use of nanoparticles in Cells for Therapeutic Applications

No. of Openings: 1

Description: Aims of the Project: Synthesis of nanoparticles in flow systems for therapeutic applications. Design of Au-based functionalised colloidal nanoparticles for cancer diagnosis and potential treatment. Study the effect of size and shape, and final morphology. Use of monometallic and bimetallic nanoparticles based on Au, Ag and Cu. Study the effect of stabiliser. Apply the synthesised nanoparticles for possible biomedical applications, such as: Targeted Drug Delivery, Enhanced Imaging, Therapeutic Agents Multifunctionality, Overcoming Drug Resistance and Personalized Medicine. CFD modelling on the formation of the AuNPs and mechanistic studies for cancer applications.

Required Qualifications: Candidates should possess an undergraduate degree and postgraduate qualification at the Master level from accredited universities in chemical engineering, or any other related field. A strong background in computer programming using MATLAB, gPROMS, COMSOL Multiphysics or similar languages is required

Funding: n/a

Research Advisor:

Name/Surname: Dr Achilleas Konstantinou

Position: Associate Professor

Email: a.konstantinou@cut.ac.cy

Doctoral Vacancy Announcement form

Research Topic Title: Development of Sustainable Active Packaging Materials from Microalgal Biomass and Bioactive Compounds

No. of Openings: 1

Description: The PhD project aims to develop economically viable and environmentally sustainable packaging materials from microalgal biomass and to assess how these materials affect the quality and safety of perishable foods and cosmetic products throughout the supply chain. The research will explore the use of organic residues to support the co-cultivation of microalgae and bacteria for the production of biopolymers, such as polyhydroxybutyrate (PHB), and bioactive compounds, including polyunsaturated fatty acids (PUFAs) and carotenoids. It will investigate cultivation strategies, including conditions selected to enhance the production of these target compounds. The resulting materials will be formulated and characterised as biodegradable packaging systems, and they will be subsequently evaluated for their effects on product quality and safety. The PhD candidate will investigate sustainable routes for converting biowaste into novel biomaterials, while reducing its potential environmental impact.

Required Qualifications: Candidates should possess a Bachelor's and postgraduate degree of Master's level from accredited Universities in Chemical Engineering, Chemistry, Biotechnology, Bioengineering, Biology, Environmental Engineering or any other related field and to be fluent in English. Past practical experience in bioprocess development will be an advantage.

Funding: Two EU-funded MSCA Staff Exchanges projects (AQUAPACK - https://aquapack.aua.gr/ - and BIOreCURE) offer opportunities for fully funded research secondments in other European countries. Subject to the projects' arrangements, the successful candidate may undertake secondments of up to 24 months in the labs participating in each EU project,

either as a single stay or across several periods. During each month of secondment, the candidate would receive a net amount of approximately €2,300 - €2,500. Participation in the above research secondments is entirely optional and will take place only if the PhD candidate chooses to participate. Depending on the candidate's qualifications and the availability of funding, financial support from other laboratory resources may also be possible.

Research Advisor:
Name/Surname: Michalis Koutinas
Position: Professor, Environmental Bioprocessing Lab (https://enblab.weebly.com/), Department of Chemical Engineering
Email: michail.koutinas@cut.ac.cy

Doctoral Vacancy Announcement form

Research Topic Title: Biological Recycling of Bioplastic Waste into Added-Value Products

No. of Openings: 1

Description: Although biodegradable plastics offer potential environmental benefits, different bioplastics cannot degrade readily in marine or terrestrial environments and their release into the ecosystem must be prevented. The PhD project will develop novel bioprocesses for the recycling and valorisation of major bioplastics. Selected biopolymers will be broken down into monomers or other suitable intermediates, which will be subsequently used as feedstocks in tailored fermentation processes aiming to produce value-added products, such as bioplastics, biofuels and biochemicals. The PhD candidate will investigate sustainable routes for converting bioplastic waste into useful products, while reducing its potential environmental impact.

Required Qualifications: Candidates should possess a Bachelor's and postgraduate degree of Master's level from accredited Universities in Chemical Engineering, Chemistry, Biotechnology, Bioengineering, Biology, Environmental Engineering or any other related field and to be fluent in English. Past practical experience in bioprocess development will be an advantage.

Funding: Two EU-funded MSCA Staff Exchanges projects (AQUAPACK - https://aquapack.aua.gr/ - and BIOreCURE) offer opportunities for fully funded research secondments in other European countries. Subject to the projects' arrangements, the successful candidate may undertake secondments of up to 24 months in the labs participating in each EU project, either as a single stay or across several periods. During each month of secondment, the candidate would receive a net amount of approximately €2,300 - €2,500. Participation in the above research secondments is entirely optional and will take place only if the PhD candidate chooses to participate. Depending on the candidate's qualifications and the availability of funding, financial support from other laboratory resources may also be possible.

Research Advisor:
Name/Surname: Michalis Koutinas
Position: Professor, Environmental Bioprocessing Lab (https://enblab.weebly.com/), Department of Chemical Engineering
Email: michail.koutinas@cut.ac.cy

Doctoral Vacancy Announcement form

Research Topic Title:
Application of Advanced Oxidation Processes (AOPs) for the detoxification of cyanotoxin contaminated water

No. of Openings: 1

Description:
The presence and subsequently the removal of micropollutants like pesticides, hormones, medical drugs and naturally occurring toxic metabolites (cyanotoxins) from water resources comprises a challenge for the water and wastewater industry. In order to remove micropollutants in trace concentrations from water resources chemical oxidation technologies such as ozonation and advanced oxidation processes (AOPs) are increasingly used to treat different types of source water and wastewater. The aim of this thesis is to explore the potential application of various AOPs for the removal of a group of natural toxins produced from the toxic strains of cyanobacteria, commonly known as cyanotoxins. The study aims to determine the tested AOPs efficiency and energy demands, toxicity of end product and unveil the transformation products. This will be a collaborative project with the University of Gdansk in Poland (Prof. Hanna Mazur-Marzec).

Required Qualifications:
Successful candidates must possess a Bachelor's degree from an accredited University in Chemistry or Chemical Engineering or Biochemistry and/or a postgraduate degree (Master level) from an accredited University in the field of Environmental Chemistry, Analytical Chemistry, Toxicology, Environmental Science or Environmental Engineering. The candidates must be fluent in English. Previous experience in the above-mentioned research topic will be considered as an advantage.

Funding:
N/A

Research Advisor:
Name/Surname: Maria G. Antoniou
Position: Associate Professor
Email: maria.antoniou@cut.ac.cy

Doctoral Vacancy Announcement form

Research Topic Title:
Detection and removal of taste and odor compounds from surface waters contaminated with cyanobacterial harmful blooms (cyano-HABs)

No. of Openings: 1

Description:
Cyanobacteria (blue-green algae) are phototrophic microorganisms and represent an essential component of the food web in all aquatic ecosystems. However, certain strains of cyanobacteria have the ability to produce bioactive secondary metabolites along with taste and odor compounds that make the water unfit for use. Climate change and anthropogenic activities are major contributors towards the more frequent and prolonged appearance of cyanobacterial harmful blooms (Cyano-HABs) across the globe, adding further pressure on scarce fresh water supplies. In order to mitigate the effects of cyanobacteria and cyanotoxins measurements need to be taken at source. This study aims to apply advanced analytical techniques to identify taste and odor compounds (beyond the terpenoids geosmin and MIB) apply various physico-chemical methods for restoring cyanobacterial contaminated sites. This will be a collaborative project with the Technical University of Crete (Prof. Elia Psillakis).

Required Qualifications:
Successful candidates must possess a Bachelor's degree from an accredited University in Chemistry, Environmental Engineering, Chemical Engineering and/or a postgraduate degree (Master level) from an accredited University in the field of Environmental Chemistry, Analytical Chemistry, Environmental Science or Environmental Engineering. The candidates must be fluent in English. Previous experience in the above-mentioned research topic will be considered as an advantage.

Funding:

N/A

Research Advisor:
Name/Surname: Maria G. Antoniou
Position: Associate Professor
Email: maria.antoniou@cut.ac.cy

Doctoral Vacancy Announcement form

Research Topic Title: Modelling and Simulation of active matter microengineering

No. of Openings: 1

Description:
Over the past decade, active catalytic colloids have emerged as a prototypical system for studying self-propelled motion at microscopic scales, with promising applications in microfluidics, micro-machinery, and therapeutics. Their motion in a viscous fluid hinges on their ability to induce surface slip flows from self-generated solute gradients.
This doctoral work will explore self-propulsion, suspension dynamics, and fluid–structure interactions at the microscale, contributing to the design of next-generation microengineering and soft robotic systems. The successful candidate will develop theoretical and computational models combining fluid mechanics, transport phenomena, and interfacial physics.

Required Qualifications:
Candidates should possess a Bachelor's and postgraduate degree of Master's level from accredited Universities in Chemical/Mechanical Engineering, Applied Mathematics, Physics, Material Science, or any other related field, have strong analytical and numerical skills, and be fluent in English.

Funding: Available, PhD Fees waived

Research Advisor:
Name/Surname: Panayiota Katsamba
Position: Lecturer
Email: panayiota.katsamba@cut.ac.cy

Doctoral Vacancy Announcement form

Research Topic Title: Design of coatings with anti-bacterial embeddings to combat AMR in high-risk settings

No. of Openings: 1

Description: Antimicrobial resistance (AMR) is a critical global health threat, responsible for 1.27 million deaths in 2019 and contributing to nearly 5 million more. This crisis demands innovative solutions to combat resistant pathogens.

Antimicrobial coatings help reduce infections by preventing microbial growth on high-touch surfaces, medical devices, textiles, and food packaging. Beyond healthcare, they have potential in wastewater treatment (WWT), where AMR hotspots emerge.

Antimicrobial-agent-embedded coatings offer an innovative approach to mitigating AMR risks by selectively targeting resistant bacteria while minimizing disruptions to beneficial microbial populations. This doctoral research will focus on the design and development of polymer-based antimicrobial coatings, with embedded antimicrobial agents. This will be achieved through a combination of modelling, computational and experimental work, that will investigate the kinetics of the antimicrobial agent-bacteria interactions, the interplay between microscale phenomena of diffusion, absorption and flow. The balance between these components will be tuned according to the competences of the selected candidates.

Required Qualifications: Candidates should possess a Bachelor's and postgraduate degree of Master's level from accredited Universities in Chemical Engineering, Biotechnology, Bioengineering, Environmental Engineering or any other related field and must be fluent in English. Applications from candidates in Applied Mathematics with a strong track-record in biomedical, industrial, engineering or environmental applications are also encouraged.

Funding: Available, PhD Fees waived

Research Advisor:
Name/Surname: Panayiota Katsamba
Position: Lecturer
Email: panayiota.katsamba@cut.ac.cy

Doctoral Vacancy Announcement form

Research Topic Title: Addressing Uncertainty in the in-silico design of circular composite materials

No. of Openings: 1

Description: Our ever-increasing waste production, averaging to about 5000kg per person and totalling 2.2 Billion tonnes across EU annually, requires accelerating our transition to a Circular Economy. At the heart of this endeavour lies waste valorisation, emphasized as a a cornerstone for sustainable growth, by the European Union's Circular Economy Action Plan.

A key challenge is addressing the uncertainty in material and morphological properties of materials derived from waste streams. In-silico design supports material development, by reducing trial and error experimentation. In the case of circular composite materials, in-silico material design requires addressing the uncertainty in material properties of constituents so that the uncertainty in the end-product is minimised and falls within acceptable QA standards.

This doctoral work will combine homogenisation techniques for composite materials, FEM simulations with Uncertainty Quantification techniques of Statistics, such as Bayesian and Monte Carlo methods. The successful candidate will extend current homogenisation techniques to address the uncertainty in morphological shapes of reinforcing additives in composite materials and the material properties of the matrix and inclusions.

The selected candidate will join an interdisciplinary research team with strong expertise in in-silico material design, mathematical modeling, computational simulations.

Required Qualifications:
Candidates should possess a Bachelor's and postgraduate degree of Master's level from accredited Universities in Chemical/Mechanical Engineering, Applied Mathematics, Physics, Material Science or any other related field and to be fluent in English.

Funding: Available, PhD Fees waived

Research Advisor:
Name/Surname: Panayiota Katsamba
Position: Lecturer
Email: panayiota.katsamba@cut.ac.cy

Doctoral Vacancy Announcement form

Research Topic Title: Modelling and simulations of the dynamics of degrading microplastics in complex environmental conditions and settings

No. of Openings: 2

Description: One of the grand challenges of our generation, and many to come, is understanding and mitigating the impact of microplastics on the environment and human health. As plastic pollution continues to escalate, driven by increasing production and inadequate waste management, microplastics have become pervasive contaminants in marine, freshwater, and terrestrial ecosystems. Their persistence, capacity to adsorb toxic substances, and potential for bioaccumulation raise critical concerns about long-term ecological and health consequences.

Addressing this challenge requires a multidisciplinary approach that integrates advanced modeling, computational simulations, and experimental studies to unravel the complex mechanisms governing microplastic degradation, transport, and interactions with biological and chemical systems. By improving our understanding of these processes, we can develop more effective strategies for monitoring, predicting, and ultimately reducing the risks associated with microplastic pollution.

The doctoral openings will examine complex microscale phenomena of degrading microplastics, examining the effect of anisotropic particle geometries, surface degradation phenomena and environmental conditions, in fluidic or porous media. The balance between modelling, computational work (and potential experimental work) will be tuned according to the competences of the selected candidates.

The selected candidate will join an interdisciplinary research team with strong expertise in mathematical modeling, computational simulations (Prof Tom Montenegro-Johnson, University of Warwick), laboratory work and microplastic pollution research (Prof Stefan Krause, University of Birmingham).

Required Qualifications: Candidates should possess a Bachelor's and

postgraduate degree of Master's level from accredited Universities in Chemical/Environmental/Mechanical/Bio Engineering, Applied Mathematics, Physics, Material Science or any other related field and to be fluent in English.

Funding: Available, PhD Fees waived

Research Advisor:
Name/Surname: Panayiota Katsamba
Position: Lecturer
Email: panayiota.katsamba@cut.ac.cy

Research Topic Title: Water Recovery through Forward Osmosis and Its Integration into Wastewater Treatment Systems

No. of Openings: 1

Description: Forward Osmosis (FO) is a membrane-based separation technology that utilizes the osmotic pressure difference between two solutions to drive water transport through a semipermeable membrane, without the need for high external pressure. Particular research interest lies in the use of fertilizers as draw solutions, which, due to their high osmotic pressure, enable water recovery from various sources, including treated and untreated wastewater and brackish water. During the process, water is transported across the membrane into the fertilizer solution, resulting in its dilution and producing a nutrient-rich solution that could potentially be used for agricultural irrigation and fertilization (fertigation). At the same time, water removal from wastewater leads to its concentration, creating opportunities for further treatment through anaerobic digestion for biogas production. The PhD research will investigate the performance of forward osmosis, the selection of suitable fertilizers and other draw solutions, membrane performance and fouling, the quality of the resulting solutions,

and the effect of wastewater pre-concentration on anaerobic digestion performance. The doctoral research will be linked to the research project **OsmoFert (Development and Validation of Novel Draw Solutions for Forward Osmosis Fertigation Using Alternative Water Resources)**, funded by the Research and Innovation Foundation (RIF) of Cyprus.

Required Qualifications: Candidates should possess a Bachelor's and a postgraduate degree at Master's level from accredited universities in Chemical Engineering, Chemistry, Biotechnology, Bioengineering, Biology, Environmental Engineering, or any other related field, and be fluent in English.

Funding: Funding is secured for the first year of the PhD research through the **OsmoFert** project (*Development and Validation of Novel Draw Solutions for Forward Osmosis Fertigation Using Alternative Water Resources*), funded by the Research and Innovation Foundation (RIF) of Cyprus. Financial support in subsequent years will be provided through other research funding sources, subject to the candidate's satisfactory research progress and performance. For further information, interested candidates may contact the Research Advisor.

Research Advisor

Name/Surname: Dr. Ioannis Vyrides

Position: Associate Professor

Department: Department of Chemical Engineering, Cyprus University of Technology

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