



Thesis Master's proposals

Please take into account that Master Thesis requires a presentation and defense at EEBE at the corresponding period.

When you receive an acceptance from the advisor, please apply to EEBE following the instructions on the website.

Ten en cuenta que en estos dos últimos casos de proyecto, es necesario el depósito y defensa en la EEBE en las fechas indicadas.

Una vez recibas la aceptación por parte de tu tutor, haz tu solicitud en la EEBE siguiendo las indicaciones de nuestra página web.

Science and Materials Engineering

Advanced Materials Science and Engineering (AMASE)

Chemical Engineering

Academic Year 2018/2019

Títol: Integration of ion-exchange and membrane technologies for valorization of mining and industrial effluents containing rare earth elements (REE): promoting circular economy approaches

Descripció: In this project effluents collected in abandoned mines suffering acid-mine drainage and solid wastes generated in the on-site treatment of such effluents will be evaluated as potential secondary REE resources. Liquid samples and solid wastes will be characterized chemically and the composition on REE and transition metals will be determined to develop separation and concentration processes using ion-exchange and membrane technologies.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Jose-Luis Cortina, Mahrez Hermassi

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Integration of ion-exchange and membrane technologies for valorization of domestic waste incineration bottom ash: promoting urban mining solutions (mahrez)

Descripció: In this project incineration bottom ash from solid urban wastes collected in TERSA Waste To Energy Plant will be evaluated as potential secondary valuable metals. Solid wastes will be characterized chemically and the composition on valuable metals and transition metals will be determined to develop separation and concentration processes using ion-exchange and membrane technologies.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Cesar Valderrama/ Jose-Luis Cortina/ Mahrez Hermassi

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: New polymeric ion-exchange membranes for selective ions separation processes: determination of permselectivity coefficients (marc)

Descripció: Transport of ions on monovalent ion-exchange membranes will be characterized by using flat-sheet set-ups to determine the permselectivity factors. Ions transport properties will be used to design new separation processes to recover valuable elements.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Marc Fernandez/ Andriy Yaroshchuck, Jose-Luis Cortina

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Valorization of ammonium urban water cycle by Integration of liquid-liquid membrane contactors: production of liquid fertilizers

Descripció: Ammonia is a species that presents a serious environmental problem because its excess in the ecosystem generates the known process of eutrophication. Therefore, in order to accomplish the EU legislation, the quantity of ammonia in the urban wastewater should be lower than 1 mg/L. For this reason, tertiary treatments of an industrial wastewater treatment plant (WWTP), such as adsorption or ion exchange, are used to diminish the nutrient values as in the case of ammonia (from 0.5-2 g/L to 0.05-0.1 g/L NH₄). However, after these treatments, it is common to obtain effluents with a higher content of ammonia, which does not accomplish with the legislation requirements. Therefore, the objective of this project is the use of a membrane technology, such as hollow fiber liquid-liquid contactors to diminish the quantity of ammonia. It is a novel, low cost and ecofriendly technique, which can be used to recover the ammonium of the wastewater, and subsequent transformation into ammonium nitrate or phosphate. Thus, on the one hand the ammonium content of industrial effluent will be reduced, and on the other hand an added value to ammonium salts will be given for its use as a liquid fertilizer in the industry. Some experiments will be conducted by a lab-scale set-up, samples obtained will be analyzed by equipment based on different analytic techniques, produced salts by the liquid-liquid contactor will be characterized and data treatment will be carried out in order to discuss the obtained results.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Cesar Valderrama/ Jose-Luis Cortina/Xanel Vecino

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Valorization of ammonium urban water cycle by Integration of liquid-liquid membrane contactors and membrane electro dialysis

Descripció: In an industrial wastewater treatment plant (WWTP), after tertiary treatment (e.g. adsorption, ion exchange, etc...), it is common to obtain effluents with a high content of ammonia. This ammonia is a species that presents a serious environmental problem because its excess in the ecosystem generates the known process of eutrophication. Then, as an alternative to valorize the ammonia, the use of two membrane technology is proposed: hollow fiber liquid-liquid contactor and electro dialysis. Both techniques are novel, low cost and ecofriendly, which can be used to recover the ammonium of the wastewater effluents, and subsequent transformation into ammonium nitrate or ammonium phosphate. Thus, on the one hand the ammonium content of industrial effluent will be reduced, and on the other hand an added value to ammonium salts will be given for its use as a liquid fertilizer in the industry. The main objective of this project is based on the integration of two innovative membrane techniques for the recovery of ammonia (by the hollow fiber liquid-liquid contactor) and for the concentration of the ammonia salt (by electro dialysis) to reach the percentage of ammonium nitrate required in industries. Some experiments will be conducted by lab-scale set-ups, samples obtained will be analyzed by equipment based on different analytic techniques, produced salts by the liquid-liquid contactor and membranes used will be characterized and data treatment will be carried out in order to discuss the obtained results.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Xanel Vecino/ Mònica Reig/ Cesar Valderrama/ Jose-Luis Cortina

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Development of reactive sorbents for removal of P from urban waste waters: reaching ultra-low levels of P (mahrez)

Descripció: This project will evaluate new adsorbents and ion exchangers nanoparticles of hydrated metal oxides (HFO) as a selective sorbents for phosphate to achieve ultra low levels (ppb). The hybrid anion exchangers and sorbents should combine the durability and mechanical strength of a polymeric weak base anion exchange resin with the high sorption affinity of HFO towards phosphate species.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Cesar Valderrama/ Jose-Luis Cortina/ Mahrez Hermassi

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Integration of polymeric nanofiltration membranes on rare earth elements recovery

Descripció: Acid Mine Drainage represents an environmental problem due to its high content on heavy metals, including rare earth elements, which are needed for improving and maintaining our quality life. The scarcity of these elements in mining sites makes necessary to find other sources to obtain them. Its presence in an amount relatively high (~10 ppm) makes feasible the application of membrane technology to recover them. This work is focused on the application of polymeric nanofiltration membranes to recover REE from AMD.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Oriol Gibert/ Jose-Luis Cortina/ Julio Lopez

Titulació: Màster Enginyeria Química/Enginyeria de Materials

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Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Oriol Gibert/ Jose-Luis Cortina/ Julio Lopez

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Integration of ceramic nanofiltration membranes on rare earth elements recovery

Descripció: Acid Mine Drainage represents an environmental problem due to its high content on heavy metals, including the presence rare earth elements, which are needed for improving and maintaining our quality life. The scarcity of these elements in mining sites makes necessary to find other sources to obtain them. Its presence in an amount relatively high (~10 ppm) makes feasible the application of membrane technology to recover them. This work is focused on the application of ceramic nanofiltration membranes to recover REE from AMD.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Jose-Luis Cortina/ Oriol Gibert/ Julio Lopez

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Modelling of metal ions transport on nanofiltration membranes: Applications to the recovery of rare earth elements

Descripció: The presence of REE in large amounts in Acid Mine Drainage makes necessary to recover them, in which nanofiltration membranes have been proven to be an effective treatment. Modelling of ion flux transport allows predicting the behaviour of the membrane under different conditions of concentration or acidity. This work is focused on the application of Solution-Diffusion Model to determine membrane permeabilities to ions in bulk solution by using Matlab language.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Oriol Gibert/ Jose-Luis Cortina/ Julio Lopez

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Integration of electrodialysis for the valorization of industrial streams containing valuable metal ions

Descripció: In the metallurgy and copper mining, sulfuric streams rich in copper and zinc are generated. Usually, a neutralization process for their treatment and also a management of the created waste is necessary. Nowadays, these leachates have a very low economic interest and it could be increased by recovering their metals by means of membranes technologies. Therefore, the main objective of this project is the copper and zinc recovery from the sulfuric stream by means of a novel technology based on electrodialysis, which use monovalent selective membrane: electrodialysis. By means of this technique it is possible to separate monovalent from divalent ions. Experiments will be conducted by a lab-scale set-up, samples obtained will be analyzed by equipment based on different analytic techniques, used membranes will be characterized and data treatment will be carried out in order to discuss the obtained results.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Jose-Luis Cortina /Xanel Vecino/Mònica Reig

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Valorization of ammonium urban water cycle by Integration of liquid-liquid membrane contactors and membrane electrodyalisis

Descripció: In an industrial wastewater treatment plant (WWTP), after tertiary treatment (e.g. adsorption, ion exchange, etc...), it is common to obtain effluents with a high content of ammonia. This ammonia is a species that presents a serious environmental problem because its excess in the ecosystem generates the known process of eutrophication. Then, as an alternative to valorize the ammonia, the use of two membrane technology is proposed: hollow fiber liquid-liquid contactor and electrodialysis. Both techniques are novel, low cost and ecofriendly, which can be used to recover the ammonium of the wastewater effluents, and subsequent transformation into ammonium nitrate or ammonium phosphate. Thus, on the one hand the ammonium content of industrial effluent will be reduced, and on the other hand an added value to ammonium salts will be given for its use as a liquid fertilizer in the industry. The main objective of this project is based on the integration of two innovative membrane techniques for the recovery of ammonia (by the hollow fiber liquid-liquid contactor) and for the concentration of the ammonia salt (by electrodialysis) to reach the percentage of ammonium nitrate required in industries. Some experiments will be conducted by lab-scale set-ups, samples obtained will be analyzed by equipment based on different analytic techniques, produced salts by the liquid-liquid contactor and membranes used will be characterized and data treatment will be carried out in order to discuss the obtained results.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Xanel Vecino/ Mònica Reig/ Cesar Valderrama/ Jose-Luis Cortina/.

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Development of reactive sorbents for removal of P from urban waste waters: reaching ultra-low levels of P (mahrez)

Descripció: This project will evaluate new adsorbents and ion exchangers nanoparticles of hydrated metal oxides (HFO) as a selective sorbents for phosphate to achieve ultra low levels (ppb). The hybrid anion exchangers and sorbents should combine the durability and mechanical strength of a polymeric weak base anion exchange resin with the high sorption affinity of HFO towards phosphate species.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Xanel Vecino/ Mònica Reig/ Cesar Valderrama/ Jose-Luis Cortina.

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Integration of polymeric nanofiltration membranes on rare earth elements recovery

Descripció: Acid Mine Drainage represents an environmental problem due to its high content on heavy metals, including rare earth elements, which are needed for improving and maintaining our quality life. The scarcity of these elements in mining sites makes necessary to find other sources to obtain them. Its presence in an amount relatively high (~10 ppm) makes feasible the application of membrane technology to recover them. This work is focused on the application of polymeric nanofiltration membranes to recover REE from AMD

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Oriol Gibert/ Jose-Luis Cortina/ Julio Lopez

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Integration of ceramic nanofiltration membranes on rare earth elements recovery

Descripció: Acid Mine Drainage represents an environmental problem due to its high content on heavy metals, including the presence rare earth elements, which are needed for improving and maintaining our quality life. The scarcity of these elements in mining sites makes necessary to find other sources to obtain them. Its presence in an amount relatively high (~10 ppm) makes feasible the application of membrane technology to recover them. This work is focused on the application of ceramic nanofiltration membranes to recover REE from AMD.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Oriol Gibert/ Jose-Luis Cortina/ Julio Lopez

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Modelling of metal ions transport on nanofiltration membranes: Applications to the recovery of rare earth elements

Descripció: Acid Mine Drainage represents an environmental problem due to its high content on heavy metals, including the presence rare earth elements, which are needed for improving and maintaining our quality life. The scarcity of these elements in mining sites makes necessary to find other sources to obtain them. Its presence in an amount relatively high (~10 ppm) makes feasible the application of membrane technology to recover them. This work is focused on the application of ceramic nanofiltration membranes to recover REE from AMD.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Oriol Gibert/ Jose-Luis Cortina/ Julio Lopez

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Integration of electrodialysis for the valorization of industrial streams containing valuable metal ions

Descripció: In the metallurgy and copper mining, sulfuric streams rich in copper and zinc are generated. Usually, a neutralization process for their treatment and also a management of the created waste is necessary. Nowadays, these leachates have a very low economic interest and it could be increased by recovering their metals by means of membranes technologies. Therefore, the main objective of this project is the copper and zinc recovery from the sulfuric stream by means of a novel technology based on electrodialysis, which use monovalent selective membrane: selectrodialysis. By means of this technique it is possible to separate monovalent from divalent ions. Experiments will be conducted by a lab-scale set-up, samples obtained will be analyzed by equipment based on different analytic techniques, used membranes will be characterized and data treatment will be carried out in order to discuss the obtained results.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Oriol Gibert/ Jose-Luis Cortina/ Julio Lopez

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Dinàmica de fases vítries // Dynamics of phases vítries.

Descripció: Els vidres són materials amorfs, per tant desordenats, que provenen del sobre-refredament d'un líquid i per tant constitueixen materials d'aplicacions molts diverses. Es considera que un material ha assolit l'estat vitri quan el temps característic del moviment de les seves molècules és de uns 100 s. Aquest temps característic pot ser determinant mitjançant diferents tècniques experimentals, entre aquestes essent la més utilitzada l'espectroscòpia dielèctrica. Aquesta tècnica permet la determinació dels temps característics en funció de la temperatura (i/o de la pressió) per a materials moleculars amb moment dipolar. La mesura del temps característic des de la fase líquida fins a la fase vítria té per objectiu conèixer la dinàmica de les molècules que formen el material i, per tant, conèixer les propietats físiques dinàmiques que determinaran la versatilitat en una determinada aplicació del material. El projecte consistirà en l'estudi de la dinàmica de materials que donen lloc a fases vítries en funció de la temperatura i/o de la pressió.

Competències genèriques proposades: Aprenentatge autònom, treball en equip, ús d'una tercera llengua, i ús solent de recursos d'informació.

Ponent: Josep Lluís Tamarit

Titulació: Màster en Enginyeria Química/Màster en Enginyeria de Materials

Title: Analysis of direct and iterative solvers for inverse analysis

Description: Inverse problems involve the computation of forces from a set of observed displacements. These problems require the solution of a system of linear equations. As the size of microscopic images increases, the size of the system also does. In these cases, the use of direct algorithms becomes more prohibitive due to memory allocation and computational time. For this reason, the use of iterative algorithms (Gauss-Seidel, Jacobi, or conjugate gradients) is more attractive. In this TFM, some available algorithms will be developed and tested. The resulting optimal algorithms will be applied to real inverse problems in biomechanics.

Suggested competences: Autonomous learning; Third language (English); Fluent use of information resources

Supervisor: Jose J Muñoz Romero (j.munoz@upc.edu)

Degrees: Ciència i Enginyeria de Materials, Advanced Materials Science and Engineering (AMASE)

Title: Numerical modelling of time-delayed chemo-mechanical signalling in cellular tissues.

Description: Cellular tissues exhibit a fluid like behaviour at long term, with observed mass-less oscillations. It is believed that the delay between the mechanical and chemical signalling is responsible of these oscillations. It has been tested that persistent oscillations can be reproduced above a critical time-delay. This TFM aims to numerically model these systems using time-delayed differential equations, and analytically deduce the presence of this critical time.

Suggested competences: Autonomous learning; Third language (English); Fluent use of information resources.

Supervisor: Jose J Muñoz Romero (j.munoz@upc.edu)

Degrees: Ciència i Enginyeria de Materials, Advanced Materials Science and Engineering (AMASE)

Title: Flexible mechanisms analysis

Description: Active networks in biology are able to actively contract by creating cross-links and modifying their binding/unbinding rates. The relation between their local contact conditions and the global contractile forces is still unknown. This TFM aims at modelling mechanical networks formed by connected trusses (filaments) that have the ability to slide along each other. Active relative motion will be enabled in order to simulate the active contractility of these networks, in a similar manner as the skeleton of biological cells do during active motion.

A Matlab code based on truss Systems will be extended with the sliding contact conditions in three dimensions. Dynamic analysis will be simulated on fixed and periodic domains. The global contractility and stability as a function of filament density and relative sliding conditions will be evaluated.

Generic competences: Autonomous learning; Third language (English); Fluent use of information resources.

Supervisor: Jose J Muñoz Romero

Degree: Ciència i Enginyeria de Materials, Advanced Materials Science and Engineering (AMASE)

Title: Cytoskeletal actin dynamics analysis during tissue closure

Description: A vertex mechanical model will be employed to simulate the closure process of cellular tissues. Cell boundaries and their cytoskeleton are represented by trusses, which are able to change their rest-length and contract.

The model will be used to mechanically simulate the closure of wounds or epithelia during development. The ability to form rosettes (all cells joining on a point) or a zipping effect will be evaluated. Regulatory mechanisms will be considered and included in the model, which will be also extended to three dimensions and analyse how cell aggregates from monolayer tissues. This TFM will be a joint collaboration with a research group at University College London.

Generic competences: Autonomous learning; Third language (English); Fluent use of information resources.

Supervisor: Jose J Muñoz Romero

Degree: Ciència i Enginyeria de Materials, Advanced Materials Science and Engineering (AMASE)

Title: 3D vertex network analysis for epithelial mechanical analysis

Description: Cell monolayers are able to migrate, remodel, reorganise and close gaps in organisms. In this TFM, a three-dimensional vertex model will be employed to simulate these autonomous features. By applying different active behaviour on the truss system that represent cells, and a set of regulatory mechanisms, the response such as area, volume or height evolution of the monolayer will be tested.

The existent Matlab code will be modified and extended with active laws and visualised with Paraview. Experimental images will be analysed and compared with the numerical results. This TFM will be a joint collaboration with a research group at University College London.

Generic competences: Autonomous learning; Third language (English); Fluent use of information resources.

Supervisor: Jose J Muñoz Romero

Degree: Ciència i Enginyeria de Materials, Advanced Materials Science and Engineering (AMASE)

Title: Time-Delay differential equations

Description: Cellular systems actively oscillate like fluids, but at much longer periods. When seen in accelerated motion, the displacements of cell boundaries resemble those of a fluid. However, inertial forces and acceleration are negligible, and thus cannot be obtained from the usual wave equations.

One of the hypotheses is that the delay between mechanical and chemical signalling may be causing the observed persistent oscillations. In this TFM this hypothesis will be tested using a computational simplified model of cells. The presence of critical delay systems will be numerically and analytically verified.

Generic competences: Autonomous learning; Third language (English); Fluent use of information resources.

Supervisor: Jose J Muñoz Romero

Degree: Ciència i Enginyeria de Materials, Advanced Materials Science and Engineering (AMASE)

Title: Mechanical inverse analysis in active soft tissues

Description: Current microscopy techniques allow researchers to obtain accurate displacement field of organisms during their early development. These images will be here employed to compute the most plausible forces that generate these deformations by using inverse techniques.

In this TFM, a Matlab Finite Element based code will be employed to compute the equilibrated contractility profiles that cells exert during tissue embryonic development. This TFM will be a joint collaboration with a research group at Parc Científic Barcelona and National University of Singapore.

Generic competences: Autonomous learning; Third language (English); Fluent use of information resources.

Supervisor: Jose J Muñoz Romero

Degree: Ciència i Enginyeria de Materials, Advanced Materials Science and Engineering (AMASE)

Title: Control of Mechanical Active Soft Materials

Description: The development of soft robots is becoming a very active research area due to its multiple and wide range of applications at multiple scales.

In this TFM, a Matlab Finite Element code for large deformations will be implemented and enhanced with the ability to contract along some preferential directions. The model extended with control capabilities on these contractilities in order to accomplish certain objectives (tasks). Sequential inverse analysis will be also exploited in order to retrieve optimal direction and magnitude of internal forces.

Generic competences: Autonomous learning; Third language (English); Fluent use of information resources.

Supervisor: Jose J Muñoz Romero

Degree: Ciència i Enginyeria de Materials, Advanced Materials Science and Engineering (AMASE)

Títol: Ajuste químico de la reología de un fluido súper-viscoso de poliuretano

Descripció: In the metallurgy and copper mining, sulfuric streams rich in copper and zinc are generated. Usually, a neutralization process for their treatment and also a management of the created waste is necessary. Nowadays, these leachates have a very low economic interest and it could be increased by recovering their metals by means of membranes technologies. Therefore, the main objective of this project is the copper and zinc recovery from the sulfuric stream by means of a novel technology based on electrodialysis, which use monovalent selective membrane: selectrodialysis. By means of this technique it is possible to separate monovalent from divalent ions. Experiments will be conducted by a lab-scale set-up, samples obtained will be analyzed by equipment based on different analytic techniques, used membranes will be characterized and data treatment will be carried out in order to discuss the obtained results.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita.

Ponent: Oriol Gibert/ Jose-Luis Cortina/ Julio Lopez

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Automated online and real-time monitoring of environmental risk

Descripció: Environmental monitoring is often performed by analysing levels of pollutants/stressors or using caged/sentinel species in the recipients under investigation. These approaches rely on advanced sampling, complicated lab-based chemical analysis, and/or lab/field-based bioassay (bioanalytical) assessment that are not readily amendable to automated approaches. The objective of the present project is to develop and evaluate a flexible monitoring platform using automated remote sensor technology for metals with real-time calculation and visualization of environmental risk for community and industrial relevant applications.

Competències genèriques proposades: Aprendizaje autónomo; Expresión oral y escrita. Trabajo en el laboratorio, uso de instrumentación y aprendizaje de técnicas analíticas. Trabajo en equipo.

Ponent: Antonio Florido

Titulació: Màster Universitari en Enginyeria Química, Màster Universitari en Enginyeria Ambiental, Màster Universitari en Enginyeria Industrial, Màster Universitari en Ciència i Enginyeria de Materials, Doble Màster Universitari en Enginyeria Industrial i Enginyeria Química

Títol: Nous recobriments i biomaterials per a teràpies en medicina regenerativa // New coatings and biomaterials for therapies in regenerative medicine

Descripció: Aquest projecte de recerca pretén estudiar i optimitzar diferents estratègies de funcionalització de biomaterials amb biomolècules i recobriments multifuncionals. Aquests materials seran dissenyats amb la capacitat per guiar el comportament cel·lular i/o exhibir propietats antibacterianes, entre d'altres, de cara a desenvolupar nous biomaterials per diferents àmbits mèdics.

Competències genèriques proposades: Aprenentatge autònom; Ús solvent dels recursos d'informació; Tercera llengua (anglès)

Ponent: Carles Mas

Titulació: Màsters en Enginyeria Biomèdica, Ciència i Enginyeria de Materials, AMASE

Títol: drugs transport through protein channels of cell membrane.

Descripció: Understanding the phenomena of transport through nanoporous of biological and/or artificial origin and its molecular modeling has had a strong interest in the last decades. This TFM aims to conduct a theoretical study, using molecular simulation techniques, on the selectivity and transport of different molecules of biological interest through the OmpF porine, a protein located in the cell membrane of certain bacteria. Recently our research group has immobilized porines in nano-perforated artificial nano membranes with potential application such as biosensors and/or biofiltration. Following this work, we intend to study the selectivity of the OmpF protein facing glucose, dopamine and ATP molecules as well as the different molecule-protein interactions, which understanding can facilitate a better design of future modified protein channels.

Competències genèriques proposades: Ús solvent dels recursos d'informació, aprenentatge autònom, ús adequat de les eines informàtiques existents.

Ponent: Joan Torras Costa.

Titulació: Màster Enginyeria Química/Enginyeria de Materials

Títol: Design of a dry reforming reactor for CO2 conversion to useful energy vectors

Descripció: Conversion of methane and carbon dioxide, which are two of the cheapest and most abundant carbon-containing materials, into useful products is an important area of current catalytic research. This reaction has also very important environmental implications because both methane and carbon dioxide are greenhouse gases which may be converted into valuable feedstock. The aim of this work is to propose a catalytic reactor design for the conversion of methane and carbon dioxide. In this sense, simulations will be carried out from Ansys® software by means of Fluent CFD models. Then, a sensitive analysis will be performed to study the influence of flowrate, reactant ratio, pressure and temperature on the reaction conversion and selectivity profiles. Finally, a reactor prototype and optimum operational conditions will be proposed.

Competències genèriques proposades: Aprenentatge autònom, ús solvent de recursos d'informació, comunicació eficaç oral i escrita, tercera llengua.

Ponent: Teresa Andreu

Titulació: Master en Ciència i Enginyeria de Materials/Enginyeria Química

Títol: Recobriment biològic d'implants dentals per a millorar la integració//Biological coating of dental implants to improve integration

Descripció: En aquest projecte de recerca es pretén bioactivar materials metàl·lics amb biomolècules que mimetitzen processos naturals per tal de estimular la interacció cel·lular i millorar la integració del biomaterial.

Competències genèriques proposades: Aprenentatge autònom; Expressió oral i escrita; Tercera llengua (anglès); Treball en equip

Ponent: Jordi Guillem **Titulació:** Màsters en Enginyeria Biomèdica, Ciència i Enginyeria dels Materials, AMASE

Títol: Efectes barocalòrics a l'estat sòlid per a refrigeració//Barocalóricos effects in the solid state for refrigeration..

Descripció: La majoria de sistemes de refrigeració actuals es basen en l'expansió i compressió de gasos amb un potencial d'efecte hivernacle milers de vegades superiors al CO₂, que sovint són alliberats a l'ambient per fuites accidentals. L'ús massiu d'aquests dispositius fa que el perjudici ecològic d'aquests gasos sigui significant de manera que és necessari trobar solucions tecnològiques més sostenibles. Recentment s'ha proposat un mètode de refrigeració alternatiu basat en els efectes calòrics que tenen lloc en un material prop d'una transició de fase a l'estat sòlid. Els efectes calòrics es defineixen com els canvis d'entropia isoterms i els canvis de temperatura adiabàtics que tenen lloc en un sistema quan se li aplica un camp extern. Aquest camp pot ser magnètic, elèctric o mecànic (esforç uniaxial o pressió), en funció de la naturalesa de la transició. No obstant, l'aplicació de camps magnètics, elèctrics i esforços presenten problemes com el cost dels materials magnètics, els baixos camps de ruptura dielèctrica i la fatiga mecànica, que limiten la seva aplicació. En canvi, els efectes calòrics per pressió (barocalòrics, BC) podrien superar aquests obstacles, sempre que es trobin materials BC òptims. En el marc de la recerca bàsica, aquest treball proposa determinar els efectes BC d'uns compostos ferroelèctrics que, d'acord amb les seves característiques transicionals conegudes, són molt prometedors. La caracterització es farà mitjançant experiments de calorimetria estàndard a pressió normal i anàlisi tèrmic diferencial a alta pressió, i el tractament posterior de les dades obtingudes i de dades existents a la literatura.

Competències genèriques proposades: Aprenentatge autònom; ús solvent dels recursos d'informació; Comunicació eficaç oral i escrita; Tercera llengua (Anglès).

Ponent: Pol Lloveras

Titulació: Màster en Enginyeria de Materials

Títol: Desenvolupament de biomaterials per teràpia de càncer amb plasmes freds//Title: Development of biomaterials for cancer therapy with cold plasmas

Descripció: En el projecte s'avaluaran estratègies relacionades amb els plasmes freds a pressió atmosfèrica emprats en la teràpia anticàncer, amb especial focus en determinació d'espècies reactives d'oxigen i nitrogen (RONS) generades pels plasmes. Es podran fer servir diferents mètodes de diagnòstic en medis líquids. Es podran sintetitzar biomaterials, i caracteritzar-los fisico-químicament per diferents tècniques. En funció dels resultats obtinguts es podran avaluar la seva resposta biològica.

Competències genèriques proposades: Aprenentatge autònom; Ús solvent dels recursos d'informació; Tercera llengua (anglès).

Ponent: Cristina Canal

Titulació: Màsters en Enginyeria Biomèdica, Ciència i Enginyeria de Materials, AMASE