STRIVE Projects Listing

Environmental Technologies

July 2010

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For more information, please contact research@epa.ie

Emerging of new nano-technologies for separation of ethanol and water for bio-ethanol production

Lead Organisation
University College Cork

Principal Investigator
Donal Keane

Project Type
Research Fellowship

Funded under:
STRIVE Research Fellowship Scheme 2007

Project Description
Renewable energy sources are a cornerstone of environmental policy. Ethanol is the most promising biofuel. As petrol additive it increases octane number and combustion efficiency but decreases exhaust emissions. Increasing petroleum costs are making bioethanol commercially viable. An azeotrope limits distillation to 95% ethanol/water mixtures but for fuel use the ethanol must be anhydrous. Various methods for dehydration exist but add significant costs. Pervaporation (PV) is emerging as the most environmentally sound method for dehydration but is in its infancy. This proposal seeks to study a series of novel nanomaterials emerging from UCC for use in the PV process.

Recombinant DNA approaches to enhance activity of the pathway for degradation of the toxic pollutant styrene in the bioreactor isolate P.putida CA-3: a biotechnologically significant metabolic route

Lead Organisation
University College Cork

Principal Investigator
Mark O'Mahony

Project Type
Research Fellowship

Funded under:
STRIVE Research Fellowship Scheme 2007

Project Description
Pseudomonas putida CA-3 is a bioreactor isolate capable of degrading the toxic aromatic pollutant styrene. However, in addition to styrene mineralisation to CO2 and H2O, via acetyl-CoA, this strain is also capable of redirecting styrene catabolism to biodegradable plastic production, (i.e. poly-hydroxyalkanoate), under appropriate growth conditions. This capability has considerable biotechnological significance as it facilitates the conversion of toxic waste to an eco-friendly, value added product. The current project seeks to enhance the ability of P. putida CA-3 to degrade styrene by investigating the flux through the pathway, identifying bottlenecks and applying recombinant DNA approaches to overcome them. Research outputs from this study will include recombinant strains with enhanced styrene degradation profiles and increased PHA accumulation capacities.

Minimisation of hazardous waste generated by CIP operations in the dairy processing industry

Lead Organisation
University of Limerick

Principal Investigator
Angela Boyce

Project Type
Research Fellowship

Funded under:
STRIVE Research Fellowship Scheme 2007

Project Description
The proposed research focuses on minimizing hazardous waste generation during cleaning in place operations in the dairy processing industry. The study will examine the potential of replacing currently used environmentally significant CIP agents (e.g. acid, alkali, phosphate containing detergent and hypochlorite) either partially or entirely with enzymes (proteases and lipases), which are biodegradable and have minimal environmental impact. Several recently developed commercialised enzymes as well as microbial enzymes produced in-house will be tested in terms of their suitability for this purpose by quantitatively monitoring their cleaning efficiency when applied to surfaces (stainless steel and glass) experimentally fouled with milk and milk protein fractions.

Zero Carbon Emision Microfuel Cell Design

Lead Organisation
University College Cork

Principal Investigator
Lorraine Nagle

Project Type
Research Fellowship

Funded under:
STRIVE Research Fellowship Scheme 2007

Project Description
The design of a prototype direct borohydride fuel cell is proposed using the unique catalytic compatibility of a novel nanoporous gold anode catalyst to realise the maximum energy output from a 'zero-emission' fuel. None of the more expensive platinum group metal catalysts can singularly satisfy both requirements of high catalytic activity for borohydride oxidation and low activity for its competing hydrolysis. The cell will be tested for fuel consumption, power density and total cost with the view to unveiling a competitive, environmentally cleaner energy carrier. A wireless sensor will be chosen as a demonstrator of the fuel cells power capabilities.

Development of chemically engineered nano-porous absorbents for phosphate removal from waste water streams

Lead Organisation
University College Cork

Principal Investigator
Mr. Colm Mc Manamon

Supervisor
Dr John Hanrahan /Prof. Michael Morris

Project Type
Master Scholarship

Funded under:
STRIVE Masters Scholarship Scheme 2007

Project Description
Phosphorus (P) is a major nutrient contributing to increased eutrophication of lakes and other natural waters. This results in water quality problems including increased purification costs, decreased recreational and conservation value of lakes and rivers, livestock loss and the increase of human algal toxins in eutrophic drinking water. There is increased awareness of the need to control the levels of phosphorus from point sources (e.g. municipal and industrial wastewater treatment plants). As P is largely present as phosphates chemical sequestration using standard adsorbate technologies is difficult. At University College Cork, adsorbate nanotechnologies that show high efficiencies will be developed.

Smart Heating System for Green Homes

Lead Organisation
Cork Institute of Technology

Principal Investigator
Ms Cheryl Camody

Supervisor
Tom O'Mahony

Project Type
Master Scholarship

Funded under:
STRIVE Masters Scholarship Scheme 2007

Project Description
The residential sector consumes approximately 20% of Ireland's total energy consumption; consequently energy efficiency has been one focus of recent publicity campaigns e.g. "power of one". In a typical home, space heating accounts for approximately 50% of the energy used. New developments are 'greener' though the construction materials and heating control technology (zoned heating) utilised, but older residences remain inefficient. This aim of this proposal is to design and demonstrate a retrofit for older domestic central heating systems to achieve energy efficiency. The design will combine heating zones with a smart predictive heating control for a comfortable, sustainable living environment.

Satellite Remote Sensing as a Tool for Monitoring Vegetation Seasonality

Lead Organisation
University College Cork

Principal Investigator
Mr. Brian O'Connor

Supervisor
Dr. Ned Dwyer

Project Type
Master Scholarship

Funded under:
STRIVE Masters Scholarship Scheme 2007

Project Description
Climate change is one of the driving factors in changing vegetation seasonality. The mapping and monitoring of vegetation seasonality on a broad scale can only be carried out with remote sensing technology. This research aims to develop a methodology based on satellite data to reveal the relationship between vegetation seasonality and climate in Ireland. This will then be used to look at changes in vegetation seasonality over the last decade. Potentially, this is a more robust technique than current ground based methods to observe patterns of climate change at a regional scale.

Using Recommendation Technology to Enhance Waste Exchange Services

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Lead Organisation
University College Cork

Principal Investigator
Mr.Aidan Waugh

Supervisor
Dr. Derek Bridge

Project Type
Master Scholarship

Funded under:
STRIVE Masters Scholarship Scheme 2007

Project Description
Waste exchange services connect organisations that have waste with organisations that can use it. Waste is thereby diverted from landfill, and businesses save money by reducing disposal costs and sourcing cheap materials. Waste exchange web sites presently offer only rudimentary search. We will develop new recommender systems technology to make more and better matches. We will use Artificial Intelligence-inspired matching algorithms to recommend opportunities to reuse, recycle and up-cycle waste. We believe this will be the first application of these ideas to waste exchange. We expect to measurably increase the volume and value of waste that gets diverted from landfill.

Implementing Passivhaus technologies to reduce environmental emissions in housing in Ireland

Lead Organisation
University College Dublin

Principal Investigator
Mr Adam Tilford

Supervisor
Vivenne Brophy

Project Type
Master Scholarship

Funded under:
STRIVE Masters Scholarship Scheme 2007

Project Description
The first house certified to Passivhaus Standard was completed in Ireland in 2005. This research proposes to undertake an analysis of the data collected by a monitoring programme and through a combination of calculation and simulation techniques to obtain a better understanding of the actual performance of the Passivhaus Standard in a maritime climate, and to propose an optimised, cost effective technical solution for its application to the delivery of Irish housing

The Development of a Quality Management System for Urban Wastewater Treatment Plants in Ireland.

Lead Organisation
Limerick Institute of Technology

Principal Investigator
Ms. Niamh Devane

Supervisor
Dr. Josephine Treacy

Project Type
Master Scholarship

Funded under:
STRIVE Masters Scholarship Scheme 2007

Project Description
In accordance with the European Pollution and Transfer Register, urban wastewater treatment plants have to report specific data on air, land and water emissions to the EPA. The competent authority subsequently transmits that data to the European Commission [1]. This project will investigate and develop quality management systems for emissions from urban wastewater treatment plants in Ireland. The work will also involve developing and pilot deployment of a quality management system comprising monitoring, analysis, inspection and compliance reporting for urban waste water treatment plants. This project will improve waste management plans in Ireland and data reporting initiatives.

1] Regulation EC No166/2006 of the European parliament and of the council of 18th January 2006, concerning the establishment of a European pollution release and transfer register and amended council directives 91/689/EEC and 96/61/EEC.

Organic Photovoltaic Materials - Identification Simulation and Characterisation for Environmentally Safe Systems.

Lead Organisation
Waterford Institute of Technology

Principal Investigator
tbc

Supervisor
Dr. Joseph O'Mahony

Project Type
Master Scholarship

Funded under:
STRIVE Masters Scholarship Scheme 2007

Project Description
The project will provide 24 months postgraduate training in the area of nanotechnology for environmental applications. The project will establish a suitable list of environmentally friendly candidate molecular systems for the production of solar electricity that have the capability to be mass produced using low cost and environmentally safe technologies. Model simulations will be developed and employed to identify a target system for manufacture based on the principles of best practice for the environment. A prototype device will be developed and its characteristics determined. Methods to improve device efficiency will be suggested. The project will produce three peer-reviewed publications.

A cost efficient method for enabling reuse of personal computers

Lead Organisation
University of Limerick

Principal Investigator
Eanna Cronin

Supervisor
Colin Fitzpatrick

Project Type
Master Scholarship

Funded under:
STRIVE Masters Scholarship Scheme 2007

Project Description
The demand for energy intensive consumer goods such as personal computers is driving enormous growth in global CO2 emissions. Much of this is unnecessary as computers are often disposed of when they are still perfectly functional but due to a total lack of 2nd hand market they are almost never reused. The root of this problem has been identified as an absence of information about how the product has been used by its first owner. This project aims to develop some technology which if implemented can help in the development of such 2nd hand markets. This has the two fold benefit of reducing the emissions associated with PC manufacture and making low cost computing available which can help to bridge the digital divide.

Novel Passive Sampling Devices for the Monitoring of Priority Pollutants

Lead Organisation
Dublin City University

Principal Investigator
Rachel MacArdle

Supervisor
Dr Fiona Regan

Project Type
Doctoral Scholarship

Funded under:
STRIVE Doctoral Scholarship Scheme 2007

Project Description
This proposal involves the development of novel passive sampling devices for routine sampling of priority pollutant chemicals. The passive samplers are based on polymer designed to enrich or sample pesticides and hydrocarbons associated with the WFD Priority pollutant list. Passive sampling is based on free flow of analyte molecules from the sampled medium to a collecting medium as a result of a difference in chemical potentials. A comparison of currently available passive sampling devices with novel materials will be carried out. The novel materials will provide greater selectivity for analyte groups and infrared spectrometry can be used for simple screening.

Legal Issues Relating to the Admissibility in Evidence of Environmental Data Gathered by Means of Remote Sampling and Self-Monitoring Techniques – the Case of Water Quality Sampling

Lead Organisation
University College Cork

Principal Investigator
Deirdre Kenny

Supervisor
Dr Owen McIntyre

Project Type
Doctoral Scholarship

Funded under:
STRIVE Doctoral Scholarship Scheme 2007

Project Description
The requirements in relation to environmental sampling under European Community and Irish law are not overly prescriptive. Directive 79/869/EEC (as amended) sets some minimal, though excludable, requirements relating to reference methods and frequencies of sampling and analysis. Section 22(1) of the 1977 Local Government (Water Pollution) Act requires a local or sanitary authority to carry out such monitoring of waters or discharges of effluents as it considers necessary or as may be directed by the Minister, while section 28(1) confers broad powers to enter premises to carry out inspections or take samples. However, despite the lack of a formal statutory requirement to carry out 'split sampling', the Irish courts would appear to be moving towards introducing a requirement similar to the 'tripartite sampling requirement' previously contained under UK water legislation. The courts are taking this approach regardless of the problems that this might cause for effective enforcement of environmental law and despite the comprehensive repeal of this requirement under UK law. This approach raises a number of critical issues regarding the admissibility of evidence gathered using remote / automatic monitoring technology and of self-monitoring information provided pursuant to a condition in an environmental licence. These problems are further complicated by the possible application of traditional rules of evidence under Irish law, such as the 'rule against hearsay evidence', the 'privilege against self-incrimination', and the general judicial discretion to exclude evidence if its prejudicial effect outweighs its probative value. This research project would examine in detail the legal background to the use of remote sensing and self-monitoring techniques and to the admissibility of evidence so gathered in criminal and civil proceedings. It would also identify

best practice in and provide guidance on the use of such techniques and make proposals for legislative reform in this area.

Cloud cover and radiation balance changes over Ireland due to aircraft induced contrails

Lead Organisation
University College Cork

Principal Investigator
Gillian Whelan

Supervisor
Dr Fiona Cawkwell

Project Type
Doctoral Scholarship

Funded under:
STRIVE Doctoral Scholarship Scheme 2007

Project Description
Future cloud cover is one of the greatest uncertainties in climate change predictions, but measurements show a recent decrease in annual sunshine hours over Ireland and commensurate increase in cloud cover. A one year contrail climatology will be derived from satellite imagery to determine the contribution of aircraft contrails to Irish cloud cover. Cloud properties in key travel corridors will be studied in detail using data from satellite laser and radar profilers. Knowledge of the nature and persistence of these high level clouds over Ireland will allow an estimate to be made of their contribution to regional atmospheric warming.

Green Organocatalysis: A biodegradation and (eco)toxicity study

Lead Organisation
Dublin City University

Principal Investigator
Thomas Michael Hayes

Supervisor
Dr Nick Gathergood

Project Type
Doctoral Scholarship

Funded under:
STRIVE Doctoral Scholarship Scheme 2007

Project Description
To identify classes of organocatalysts which are not environmentally benign and design low toxicity, biodegradable derivatives. The preparation and application in asymmetric catalysis of these novel organocatalysts as a viable alternative for the pharmaceutical industry will lead to a significant reduction in adverse environmental impact. Organocatalysis fulfils many of requirements of green chemistry: catalytic amounts of reagent, removal of toxic metal compounds, robust catalysts with reactions frequently in air without rigorous drying of solvents. However, there is no toxicity or ecotoxicity data reported for this rapidly emerging field, where similarities to the fields of PAHs and peptidomimetics raise particular concerns.

Investigation of Biodegradable Plastic Production by an Activated Sludge Microbial Consortium Treating Dairy Industry Wastewater.

Lead Organisation
University College Cork

Principal Investigator
Mary McCullagh

Supervisor
Dr Niall O'Leary

Project Type
Doctoral Scholarship

Funded under:
STRIVE Doctoral Scholarship Scheme 2007

Project Description
Polyhydroxyalkanoates, (PHAs), are biodegradable polyesters which are synthesised intracellularly by a number of microbial species when they encounter an excess of carbon substrate, offset by an inorganic nutrient limitation. The production of these 'bioplastics' has received significant, global research interest as they offer a potential replacement polymer for environmentally recalcitrant petrochemical plastics. However, fermentation costs coupled with additional downstream processing have thus far hampered the economic competitiveness of PHAs produced from pure cultures. The use of mixed microbial cultures for PHA synthesis offers a possible solution as they can utilise a range of carbon substrates and do not require aseptic fermentation equipment/handling. The current research project seeks to investigate the potential for stable PHA accumulation by an enriched, activated sludge microbial consortium utilising dairy processing wastewater as feedstock.

Synthesis of Fine-Chemicals through Solarchemical Photooxygenations and Environmental Performance Evaluations using the EATOS method

Lead Organisation
Dublin City University

Principal Investigator
Kieran Joyce

Supervisor
Dr Michael Oelgemoeller

Project Type
Doctoral Scholarship

Funded under:
STRIVE Doctoral Scholarship Scheme 2007

Project Description
This proposal describes an innovative approach in sustainable chemistry by combining solar photochemistry and fine-chemical synthesis from biomass. The project contains the installation and modification of solarchemical reactors at DCU, laboratory optimisation studies and synthetic strategies for fine-chemical synthesis from renewable materials. Four model reactions based on dye-sensitised photooxygenations are proposed, which will furnish important commodity chemicals. Technical scale productions and manufacturing cost estimations will be performed at the research site of DLR in Germany and the PSA in Spain. The environmental performances of the chosen transformations will be furthermore evaluated – in comparison with thermal alternatives – using the EATOS method.

Exploitation of sugar kinases in green chemistry

Lead Organisation
Queen's University Belfast

Principal Investigator
Helena Kristiansson

Supervisor
Dr David Timson

Project Type
Doctoral Scholarship

Funded under:
STRIVE Doctoral Scholarship Scheme 2007

Project Description
This proposal describes an innovative approach in sustainable chemistry by combining solar photochemistry and fine-chemical synthesis from biomass. The project contains the installation and modification of solarchemical reactors at DCU, laboratory optimisation studies and synthetic strategies for fine-chemical synthesis from renewable materials. Four model reactions based on dye-sensitised photooxygenations are proposed, which will furnish important commodity chemicals. Technical scale productions and manufacturing cost estimations will be performed at the research site of DLR in Germany and the PSA in Spain. The environmental performances of the chosen transformations will be furthermore evaluated – in comparison with thermal alternatives – using the EATOS method.

Carbon Nanocages as Environmental Adsorbents

Lead Organisation
University College Cork

Principal Investigator
David Burke

Supervisor
Dr Justin Holmes

Project Type
Doctoral Scholarship

Funded under:
STRIVE Doctoral Scholarship Scheme 2007

Project Description
The aim of this project is to optimise a new supercritical fluid (SCF) deposition technique developed at University College Cork, employing carbon dioxide as a solvent and a reactant, to manufacture high yields of carbon nanocages. These nanocages have large surface areas and pore volumes and will be utilised as advanced adsorbents for water purification, by selectively extracting metal ions and biological pollutants.

Demonstration of an adaptation to the activated sludge process; for reduced sludge generation

Lead Organisation
Queen's University Belfast

Principal Investigator
Mr Ciarán Prunty

Project Type
Desk Study

Funded under:
STRIVE Environmental Technology Call 2007

Project Description
This desk-scale study will verify the performance of a lab-scale activated sludge process operated under modified conditions to reduce the generation of sludge biomass. Previous microbiological studies for increased phosphate removal observed reduced sludge generation; it is thought elevated biomass metabolic rates led to increased substrate volatilisation and reduced incorporation of carbon into cellular biomass. This study will enable data collection of process parameters that are standard to wastewater engineering operations, which are crucial to the scale up of this technology, and will enable the development of concrete plans for on-site demonstration of the process at two wastewater treatment plants.

Stress induced molecular and ecological changes in soil autotrophs: carbon capture and novel compound prospecting

Lead Organisation
Dublin City University

Principal Investigator
Dr. Brian Kelleher

Project Type
Medium-Scale Study

Funded under:
STRIVE Environmental Technology Call 2007

Project Description
We recently reported that microbial presence in soil organic matter (SOM) far exceeds presently accepted values and that the contribution of microorganisms in the terrestrial environment and carbon cycling is seriously underestimated. This project will couple powerful analytical techniques that include Stable Isotope Probing (SIP) and advanced NMR, that will to allow us to assess ecological and molecular responses of autotrophic soil microbes to environmental stress and to discern actual microbial contributions to atmospheric CO2 uptake (e.g. photosynthesis). The molecular responses of as yet uncultured microbes to extreme conditions will be investigated to assess potential for use in biotechnology industry.

Biodegradable Catalytic Asymmetric Methods - A study of solvents, organocatalysts and magnetic-nanoparticlessupportedcatalysts

Lead Organisation
Dublin City University

Principal Investigator
Dr. Nick Gathergood

Project Type
Medium-Scale Study

Funded under:
STRIVE Environmental Technology Call 2007

Project Description
The development of asymmetric methodologies is one of the fundamental research areas in chemistry. The ability to selectively prepare the target chiral molecule of choice is a worthwhile goal. This project investigates methods to develop environmentally friendly asymmetric technologies by;

1) Determining impact of established catalysts
2) Utilizing low toxicity, biodegradable, task specific solvents
3) Improved chiral catalyst design
4) Developing biodegradable organocatalysts
5) Studying reactions which generate less waste
6) Applying magnetic nanoparticles supported chiral catalysts, for simplified recycling.

This work combines green chemistry and nanotechnology with toxicology and biodegradation studies and represents a new joint DCU/TCD initiative.

The design of new photocatalytic systems for the generation of hydrogen from water using solar energy

Lead Organisation
Dublin City University

Principal Investigator
Prof. Johannes G. Vos

Project Type
Medium-Scale Study

Funded under:
STRIVE Environmental Technology Call 2007

Project Description
In this project a novel solar cell for the generation of H2 from water will be developed. Ptype semiconductors will be modified with molecular components and the photocatalytic properties of these heterosupramolecular assemblies with respect to the generation of hydrogen from water will be investigated. The molecular components will consist of heterodinuclear compounds containing a light-absorbing unit connected via a bridging ligand to a catalytic centre capable of producing hydrogen. The system developed will not require sacrificial agents.

The upcycling of post consumer polyethylene to a biodegradable plastic: Waste to value added product

Lead Organisation
University College Dublin

Principal Investigator
Dr. Kevin O'Connor

Project Type
Large-Scale Study

Funded under:
STRIVE Environmental Technology Call 2007

Project Description
The project is a cross disciplinary approach to converting post consumer waste (polyethylene (PE)) into value added eco-friendly material. PE which makes up the largest proportion of plastic waste worldwide will be pyrolysed to generate two products; an oil (80%) (fuel source) and a wax (~20%) (by product). This project will investigate the ability of known polyhydroxyalkanoate (PHA) accumulating bacteria in our lab to convert the wax by product to the biodegradable plastic (PHA). We will optimise the bioprocess, model it for scale up, and characterise and process the biodegradable polymer to prepare it for application.

Micro-photochemistry - a New Resources-Efficient R&D Approach

Lead Organisation
Dublin City University and National Centre for Sensor Research (NCSR)

Principal Investigator
Dr. Mirek Macka

Project Type
Medium-Scale Study

Funded under:
STRIVE Environmental Technology Call 2007

Project Description
The proposal describes innovative and resources-efficient approaches to organic synthesis and chemical analysis. Emerging Micro-photochemistry combines organic photochemistry and microprocess engineering with advances in LED technology. Novel micro-photoreactors for predominantly homogeneous reactions will be based on microfluidic chip technology. LED-panels will be used as optimal light sources. The superiority of micro-photochemistry over conventional techniques will be demonstrated for different model reactions. Solvent efficient Solid-Phase Extraction with Capture and Photochemical Release will use for the first time covalent bond formation to extract analyte onto a monolithic microcolumn and photochemical release to elute it by an external light trigger.

Smart Catchment Demonstration: Long-term deployment of sensor monitoring system. (DEPLOY)

Lead Organisation
Dublin City University

Principal Investigator
Dr. Fiona Regan

Project Type
Medium-Scale Study

Funded under:
STRIVE Environmental Technology Call 2007

Project Description
This exciting demonstration project represents an important collaboration between research centres, SME and local authorities with technical and analytical expertise to DEPLOY, maintain and evaluate a series of multi-sensor systems to assess the effects of long-term sensor deployment on water quality monitoring systems and sensor data.
The multi-sensor systems deployed can act as a "live" platform for parallel projects (funded elsewhere) and as a test bed to implement and evaluate water quality monitoring systems and deployment infrastructure (wireless data transfer mechanisms, novel sensors, sensor interfacing etc.) required to meet the demands of the Water Framework Directive.

Flow-Proportional passive sensor validation of phosphorus and nitrogen in Irish rivers. (Flow-Pro)

Lead Organisation
University Of Ulster

Principal Investigator
Dr. Phil Jordan

Project Type
Medium-Scale Study

Funded under:
STRIVE Environmental Technology Call 2007

Project Description
Flow-Pro will test a new passive, flow-proportional sampling solution for phosphorus and nitrogen in rivers. The passive system is based on cartridges that are exposed in flowing water over defined time periods and absorb nutrients, proportional to the velocity of influent water, which are subsequently extracted in the laboratory. Over a 12-month period, weekly, fortnightly and monthly exposure periods and subsequent extractions will be compared with high-resolution datasets of phosphorus (TP and TRP) and nitrate (NO3-) in a flashy Irish river catchment. These data will be collected from existing flow and P infrastructure, augmented with new N infrastructure.

Lime Hemp Bio-Composite as a Building Material in Ireland

Lead Organisation
BESRaC - Built Environment Sustainable Research and Consultancy

Principal Investigator
Patrick Daly

Project Type
Desk Study

Funded under:
STRIVE Environmental Technology Call 2007

Project Description
Lime Hemp, as a composite material, presents strong environmental credentials and potential mainstreaming in a range of construction methods. The composite material has low toxicity, carbon sequestration, vapour permeability, good thermal properties and is potentially suitable to a range of construction solutions. A Scoping Study will be undertaken to assess the materials application / adaptation to a range of mainstream construction methods, notably timber frame, masonry; in-situ and pre cast solutions. It is envisaged that the study will identify and highlight key technical and compliance issues and lead on to further research and investigation with identified key partners to address and overcome potential barriers, most likely involving a multi partner / multi-disciplinary team, including engineering, construction, material science and environmental.

It is important to note that the project is focusing on the performance (and gaps) of hemp lime in relation to key relevant standards and guidance as outlined in the TGD's and not attempting to give an opinion on compliance.

New Nano-Structured Polymeric Membranes for the Treatment and Purification of Water

Lead Organisation
NUI Maynooth

Principal Investigator
Dr. Denise Rooney

Project Type
Medium Scale Study

Funded under:
STRIVE Environmental Technology Call 2007

Project Description
Membrane technologies are an established means for producing potable water from surface water, groundwater and industrial wastewaters. However, even the best performing nanofiltration membranes suffer from fouling, limiting their usefulness in water treatment.

We propose two new related strategies in an attempt to address this problem. The first involves chemical modification of polyamide (nylon) nanofiltration membranes with polymeric brushes so that the fouling components are prevented from reaching the membrane. The second approach involves the deposition of polypyrrole nanofibres onto nylon supports and using the exchange properties of these nanofibres to extract cationic (heavy metal) and nitrates from water.

This research encompasses elements of synthesis, electrochemistry, polymers, membrane technologies, environmental nanotechnologies and water treatment and is highly novel. Accordingly, we expect this work to lead to the publication of six peer-reviewed papers, six conference papers, the establishment of new collaborative links with national and international academic groups, industrial researchers and policy makers and form the basis for future policy documents on water resources. The research training element of the work will provide new highly trained and skilled researchers in nanotechnologies for environmental applications, contributing to the establishment of a critical mass of Irish researchers in this new emerging field.

Application of novel enzymes derived from thermoacidophiles to second-generation biofuel production

Lead Organisation
University of Limerick

Principal Investigator
Prof. Gary Walsh

Project Type
Medium Scale Study

Funded under:
STRIVE Environmental Technology Call 2007

Project Description
Novel cellulase and xylanase enzymes, maximally active at pH ~ 1.0 and 60-90oC, will be identified from thermoacidophilic microorganisms, cloned & produced by recombinant means. The enzymes will be used in application-relevant studies of the production of bioethanol from lignocellulosic feedstocks. Their use in feedstock pre-treatment regimes should allow significant, quantifiable reductions in acid and energy levels currently applied in this step. Consequent environmental (greener production), safety, bioprocess and ultimately economic benefits could significantly advance the prospects of environmentally sustainable bioethanol production from lignocellulosics.

Microfluidic platform for enzymatic biofuel cells

Lead Organisation
University of Limerick

Principal Investigator
Dr Grégoire Herzog

Project Type
Medium Scale Study

Funded under:
STRIVE Environmental Technology Call 2007

Project Description
The aim of this project is to develop all-plastic microfluidic enzymatic biofuel cells that will act as alternative energy sources for portable devices. This will be achieved by confining enzymatic biofuel cells into a microfluidic environment. The fuels targeted will be ambient and of diverse nature (glucose, organic pollutants in river or waste water). This research will improve the design of microfluidic devices for energy conversion.
This technology developed will be able to provide energy to sensor platforms deployed in the environment, using ambient fuels.

This research will allow the fabrication of a new generation of microfluidic devices for enzymatic biofuel cells. In addition, these devices will be stacked to increase the current densities being produced. The outputs of this project are expected to be innovative and of high quality, which will allow protection of the intellectual property by the filing of a patent. Publication in peer-reviewed journals in scientific journals of high standard will also be envisaged.