

Results of competition: Material innovation for a sustainable economy

Total funding available for this competition was £5m, provided by the Technology Strategy Board.

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
AD Fertiliser Technologies Limited (lead) Williams Industrial Services Limited Queens University Belfast B9 Organic Energy Limited IP Pragmatics Ltd	Prototype system to produce granular fertiliser from anaerobic digestate liquor	£591,676	£410,822
Project description (provided by applicants)			
<p>Anaerobic digestion (AD) is rapidly expanding worldwide due to its numerous benefits covering both sustainability and energy generation. AD could produce enough electricity and heat to supply a large proportion of the UK's renewable energy. The use of AD is expected to increase in the UK and there is a serious problem of disposing the current volume of waste effluent. This liquid digestate has a negative impact on the sustainability of AD since it costs money to treat before being discharged into natural water bodies or disposed of via wastewater treatment plants. We have developed a unique material process technology within a bolt-on device to convert the waste liquor from AD into an organic granular fertiliser. The nutrients are concentrated onto processed solids which can be stored and transported easily. This could provide an alternative to energy-intensive, expensive synthetic fertilisers. As part of this grant we aim to build and test a prototype device to be operated on large volumes of AD liquor at an AD plant.</p>			

Results of competition: Material innovation for a sustainable economy

Total available funding for this competition was £5m, provided by the Technology Strategy Board

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Building Research Establishment Limited (lead) MAC Limited Cemex UK Network Rail Limited	Smart green railway sleepers	£670,326	£354,304
Project description (provided by applicants)			
<p>Concrete railway sleepers have high performance requirements but currently have a relatively high environmental impact. Performance requirements are currently met with concrete mixes using a high proportion of Portland cement, leading to high embedded carbon dioxide (CO₂) content (150,000 tonnes per year). Approximately 1m sleepers are produced every year with a similar number reaching the end of their in-service life (this number equates to about 200,000 tonnes of concrete annually). The lack of data on the raw material base and sleeper history prevents sleepers, or their component parts, being recycled at end of life.</p> <p>The project will reduce lifecycle environmental impacts of sleepers whilst maintaining performance characteristics. It will achieve this by a) developing innovative concrete mixes to reduce embodied CO₂ and b) developing ICT-based solutions using embedded sensors to reduce waste in the supply chain and enable through-life monitoring to support 'circular' reuse/recycling at the end of life. A 50% reduction in embedded CO₂ and 50% recycling rate are targeted within five years.</p>			

Results of competition: Material innovation for a sustainable economy

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
C-Tech Innovation Limited (lead) Airbus Operations Limited; Poeton industries Ltd; University of Leicester	Aluminium plating process for cadmium replacement	£701,173	£496,606
Project description (provided by applicants)			
<p>The primary objective of the Aluminium plating process for cadmium replacement (ALPCAR) project is to scale up an aluminium plating process, based on a promising new generation of ionic liquids and develop a process demonstrator for an Al plating line using these new electrolytes. To date all existing Al coating technologies have either suffered from major technical limitations and/or been very expensive. The primary market being targeted within the proposed project is a replacement for cadmium within the aerospace industry.</p>			

Results of competition: Material innovation for a sustainable economy

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Econic Technologies Limited (lead) Johnson Matthey PLC Imperial College London	Development and scale-up of novel catalysts for manufacturing polyols from carbon dioxide	£662,141	£447,168
Project description (provided by applicants)			
<p>Utilising carbon dioxide (CO₂) as a chemical feedstock for polymers is an attractive proposition that scientists have investigated for 40 years. CO₂ is an abundant natural product and a problem waste emission from many chemical and energy production processes. However, it is in a very low energy state and difficult to react. Econic Technologies Ltd, an Imperial College London spin-off, has developed a catalyst technology that enables copolymerisation of CO₂ into polymers, with low energy requirements in a low pressure process. The potential applications for the polymer products include furniture, building insulation, car parts and home appliances.</p> <p>In a project, part funded by the Technology Strategy Board, Econic technologies have created and will lead a supply chain consortium that includes:</p> <ul style="list-style-type: none"> • a UK-based specialty chemicals manufacturer to scale up catalyst production • a leading multinational polymer supplier to test and scale up the products • world-class academic CO₂-polymerisation experts from Imperial College London who will study novel catalysts and mechanisms. <p>This research project will accelerate time to market enhancing UK catalyst sales revenues.</p>			

Results of competition: Material innovation for a sustainable economy

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Env-Aqua Solutions Limited (lead) C-Tech Innovation Limited Chestech Limited The Institute Of Circuit Technology Limited Invotec Group Limited Cornish Food Limited Surface Engineering Association	Sustainable treatment of waste using recycled chitosans	£726,629	£422,735
Project description (provided by applicants)			
<p>The Sustainable treatment of waste using recycled chitosans (STOWURC) project is aimed at developing sustainable materials and processes that use waste products from the seafood industry to treat effluent and recover metals from the printed circuit board (PCB) and related industries. The UK PCB industry is strategically important to the country but its chemical processes can generate waste products that are expensive to treat. The shells of crabs and other crustaceans are a source of materials known as chitosans which can absorb metals and have the ability to recover metals found in PCB manufacturing effluent. The UK's seafood industry generates large volumes of shellfish waste and the project is using this waste to produce chitosan-based materials that can sustainably treat the effluent produced by PCB makers and companies producing similar types of metal-bearing waste products. The project partners have identified international interest in using chitosan-based materials from PCB manufacturers. There are also much larger applications in other sectors, including surface engineering. Crab shells are typically expensive to dispose of and this project will enable them to become valuable raw materials.</p>			

Results of competition: Material innovation for a sustainable economy

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
International Paint Limited (lead) Revolymer PLC Insect Research and Development Limited University of Liverpool Newcastle University	Development of a novel high performance foul-release coating for marine applications	£740,133	£492,853
Project description (provided by applicants)			
<p>This project addresses high level material substitution challenge in marine anti-fouling coatings harmful to the environment. Unwanted accumulation of marine organisms on submerged surfaces (fouling) causes major problems for marine industries. Prevention, repair and increased energy consumption costs run to billions of pounds every year. Fouling can be reduced via special coatings, but many use harmful biocides and face regulatory pressure. Others use low surface energy polymers but are less effective under certain conditions. Coatings with equal or superior performance to biocides but with positive HSE profile have huge market potential. Global legislative trends restrict biocide amounts/types used in coatings. It is predicted there will be increased legislation covering biocidal products, placing further pressure on those currently in use. We propose a two-year collaborative project between a large enterprise (International Paint), SMEs (revolymer and insect research) and academia (University of Liverpool and Newcastle University) to use low molecular weight compounds and novel formulations to develop new anti-fouling coating.</p>			

Results of competition: Material innovation for a sustainable economy

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
London & Scandinavian Metallurgical Co Limited (lead) Outotec (UK) Limited University of Leeds Harriton Services LP	Clean chrome processing (CCP)	£745,105	£449,851
Project description (provided by applicants)			
AMG Superalloys (LSM), a unit of AMG Advanced Metallurgical Group N.V., a producer of highly engineered specialty metal products and vacuum technologies, are proposing to conduct research and development work into aerospace grade chromium metal. Chromium metal is a critical material for the superalloy industry with key applications in the aerospace, oil and gas and energy markets. The research will expand AMG's high value products for the aerospace industry and will have environmental, economic and employment benefits.			

Results of competition: Material innovation for a sustainable economy

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Plasma Quest Limited (lead) University of Bolton	Integrated extended planar plasma system for high-throughput manufacturing of sustainable transparent conducting oxides	£600,117	£429,997
Project description (provided by applicants)			
<p>Transparent conducting oxides (TCO) are fundamental to various large area devices essential to modern society (e.g. thin film solar cells, touch screens and flat panel displays). This project delivers an innovative pilot coating system by scaling up the unique high target utilisation sputtering (HiTUS) coating process invented in the UK to roll-to-roll capacity. This will demonstrate its high throughput coating potential for TCO production with much lower consumption of energy and materials.</p> <p>Novel conducting oxides without using depleting indium metal will be formulated using an advanced "designer" approach. Specifically formulated coatings with remarkable TCO properties will be delivered through process optimisation, demonstrating the HiTUS technology's technical readiness for commercialisation. This will provide a solid foundation for entry to a growing \$8bn market resulting from the rising demand for TCO products based particularly on sustainable and environmentally-friendly material resources. The coating system from this work can also be used in the fabrication of functional thin films for other advanced application devices.</p>			

Results of competition: Material innovation for a sustainable economy

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Polysolar Limited (lead) Solvay Interlox Limited Centre for Process Innovation Limited	Power generating and energy saving windows	£749,645	£509,000
Project description (provided by applicants)			
<p>Power generating and energy saving windows is a project which addresses the Technology Strategy Board's call for material innovation for a sustainable economy, with its objectives of reducing energy consumption and material usage in the manufacture of solar cells, while enabling a new market through the development of colourless transparent photovoltaic thermal control window glazing units that both generate and save energy as a single multi-functional building material.</p> <p>The project combines supply chain partners for Building Integrated Photovoltaics (BIPV), including developer and producer of glazing Polysolar, PV materials specialist Solvay, and HVM Catapult partner CPI. The project will be innovative in developing PV manufacturing processes without using critically scarce materials. As well as reducing energy consumption in its life and its manufacture, the PV window product offers a significant environmental impact through power generation and savings.</p>			

Results of competition: Material innovation for a sustainable economy

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Siemens (lead) Rolls-Royce PLC Indestructible Paint Limited Monitor Coatings Limited	Chrome-free aluminide slurry coatings for gas turbines	£652,239	£344,522
Project description (provided by applicants)			
<p>The aerospace engine and industrial gas turbine industries have historically used corrosion-resistant coatings manufactured from precursors that contain hexavalent chrome. These slurry based coatings are cost-effective and offer the best corrosion resistance. REACH regulations will ban the use of the hexavalent chrome precursors from September 2017. New coatings therefore need to be developed that offer the same or better high temperature corrosion resistance without a significant increase in cost. A consortium of Siemens, Rolls Royce, Indestructible Paint and Monitor Coatings have come together to develop new hexavalent chrome-free slurry coatings that can be applied to high temperature components in gas turbines. Three new formulations will be developed and tested within the programme with the aim of taking the technology to TRL4 by the end of the project, and introducing the coatings into service within three years of the end of the project.</p>			

Results of competition: Material innovation for a sustainable economy

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Twincon Limited (lead) Clean Steel (International) Limited University of Sheffield	Re-use of steel cord from tyres as reinforcement in sustainable construction	£607,503	£433,996
Project description (provided by applicants)			
<p>Approximately 1.5bn new tyres are manufactured around the world every year from more than 10m tonnes of rubber and high quality steel cord reinforcement. About 5% of this raw material is currently wasted during manufacture and is disposed of by incineration or in landfill. A new process has recently been developed to separate the unvulcanised rubber from the steel cord enabling both components to be recovered and reused.</p> <p>This project focuses on developing new high-value applications for the steel cord recovered from this process by using it as fibre reinforcement in heavily loaded concrete structures such as industrial floor slabs and tunnel linings. For this to be achieved, research is first required into refining the recovery process, automatically cutting the cord into predefined lengths and integrating it into fresh concrete specially designed for placement by either wet casting, pumping or spraying. Giving waste steel cord a second life as reinforcement in concrete only requires about 4% of the energy needed to manufacture new steel fibre reinforcement thereby making a significant contribution to improving the sustainability of the construction industry.</p>			