

Results of competition: Fuel cell manufacturing and the supply chain - Collaborative R&D

Total available funding for this competition was £5m from 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
ACAL Energy Limited (lead) Thomas Swan & Co. Limited	Fuel Cell Catalyst Manufacture - Feasibility to Pilot Plant Trials	£838,268	£502,961
Project description - provided by applicants			
<p>This 30 month project is a collaboration between ACAL Energy Ltd and Thomas Swan Ltd to develop a scalable manufacturing and synthesis route for the ACAL Energy developed FlowCath chemistry. The chemicals provide a novel catalyst technology that reduces the cost, improves performance and enhances durability of PEM fuel cell systems.</p> <p>A scalable manufacturing route is required to support licensees of the technology with a proven low-cost supply of FlowCath chemicals. Flowcath technology offers a direct system replacement for conventional PEM applications such as micro-CHP and fuel cell electric vehicles in the automotive sector. A number of OEM's are already evaluating the technology for use in their next generation of products.</p>			

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Amalyst Limited (lead) ITM Power (Trading) Limited PV3 Technologies University College London	LOCATE: LOw Cost cATalysts for water Electrolysers	£523,941	£359,104
Project description - provided by applicants			
<p>Amalyst has developed a class of low-cost, high-performance catalysts for fuel cell anodes and water electrolyser cathodes that are designed as 'drop-in' replacements for platinum.</p> <p>Following on the initial success of a Technology Strategy Board Feasibility Study for their fuel cell product, Amalyst will lead a project to further develop its class of catalysts focusing on whole-life cost reductions in water electrolyser application. ITM Power will validate the 'drop-in' credentials of the Amalyst catalyst by fabricating full-sized catalyst coated membranes using its existing production equipment. Short-term evaluations will lead to a preferred catalyst being selected for validation in a pilot-scale version of ITM's production electrolyser.</p> <p>In parallel, UCL will develop accelerated stress tests (ASTs) for water electrolysers to complement those developed for the fuel cell sector. The successful completion of the project will create a platform to greatly accelerate the adoption of the Amalyst catalysts in these markets as well as initiate a much-needed standardisation discussion within the electrolyser industry for accelerated durability testing.</p>			

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Arcola Energy Limited (lead) Horizon Fuel Cell UK Lohmann Imperial College London Technologies (UK) Limited University of Warwick	Material and process development for low cost 1-10kW UK fuel cell stack manufacturing	£1,509,126	£1,042,713
Project description - provided by applicants			
<p>This project will enable step changes in the manufacturing cost and production volumes and rate of an innovative closed cathode PEM fuel cell stacks in the power range 1-10kW for a range of applications. The project aims to achieve a low cost flexible design for low-mid volume production by taking a system approach to cell and stack components and manufacturing process.</p> <p>The project will address specific technology challenges that are bottlenecks and barriers to volume production of current stacks, will work with suppliers to integrate innovative materials and lead to component specifications optimal for performance and manufacturing. In parallel, process design and innovation will lead to automated or semi-automated processes replacing the current manual manufacturing process so that production rates can be increased by two orders of magnitude within 5 years.</p>			

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Ceres Power Limited (lead) DEK Printing Machines Limited	Applying high speed PV manufacturing technology to metal supported SOFC manufacture	£1,196,954	£662,799
Project description - provided by applicants			
<p>This collaborative industrial R&D project aims to apply high speed photovoltaic (PV) manufacturing capability developed by DEK in the UK, to Ceres Power's metal supported SOFC high value manufacturing process. This project reduces process time and waste (cost) in 2 of the key deposition and heating processes used for Ceres' Steel Cell electrolyte system.</p> <p>Ceres has validated proof of concept electrolyte deposition processes that are repeatable and offer significant material savings. DEK has world leading capabilities in SMT and PV manufacturing process equipment development and supply, and will help develop these processes from MRL2/3 to 5/7, resulting in the demonstration of prototype and pilot line capabilities of 10secs/cell (>1 million cells/year).</p> <p>This project addresses a new form of thin film deposition and a significant part of Ceres' manufacturing roadmap to prove a high volume manufacturing line design for 2017.</p>			

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HiETA Technologies Limited (lead) Intelligent Energy Limited The Logistics Business Limited University of Exeter	AMAFS (Additive Manufacture for Automotive Fuel Cell Systems)	£408,737	£275,608
Project description - provided by applicants			
The Additive Manufacture for Automotive Fuel-cell Systems (AMAFS) project will demonstrate the advances possible using the design freedoms of Additive Manufacturing to make compact, lightweight and cost effective Automotive Fuel Cell systems. A novel multi-phase heat exchanger will be developed, integrated and demonstrated to yield an automotive fuel-cell system smaller, cheaper and lighter than before.			

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Johnson Matthey Fuel Cells Limited (lead) Huxley Bertram Engineering Ltd Intelligent Energy Limited	Scalable and Innovative Manufacturing for Membrane Electrode Assemblies (SIMMEA)	£1,737,720	£883,587
Project description - provided by applicants			
<p>The objective is for Johnson Matthey Fuel Cells to develop a high-speed continuous manufacturing process for sealed Catalyst Coated Membranes, the major component of fully integrated Membrane Electrode Assemblies (MEAs), which are the energy generators in a Fuel Cell.</p> <p>The process will operate at 20 linear metres per minute, more than x10 current capability and consistent with the production requirements of the other Fuel Cell components. Manufacturing costs will be substantially reduced costs compared to the current material-limited and non-integrated processes.</p> <p>A major challenge will be to place the costly sub-components only in the areas where they are functionally active, and to develop seal materials with adhesion and release properties consistent with the target process speed. Process to attach the Gas Diffusion Layer, another MEA component and quality control development are also involved. MEAs will be qualified by Intelligent Energy in their new platform aimed at powering mobile phone masts.</p>			

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Ventec-Option Limited (lead) CNH UK Limited High Speed Sustainable Manufacturing Institute Imperial College London Imperial Innovations Ltd Surface Technology International Ltd UCL Business PLC University College London ZOT Engineering Limited	Planar Fuel Cell Manufacturing	£1,487,848	£865,614
Project description - provided by applicants			
<p>This business-led collaborative project brings together a consortium to develop novel manufacturing capabilities for PCB based fuel cells (FFC). This innovative technology, has been previously funded by the EPSRC and the Carbon Trust during early stage research.</p> <p>The technology has the potential to reduce the cost of fuel cells by up to 48%, reduce significantly the weight and volume and allow any form factor which can be built from two dimensional layers.</p> <p>The main innovation is</p> <ul style="list-style-type: none"> a) the patented technology behind this novel fuel cell, b) the integration of the manufacturing processes into existing PCB manufacturing which allows rapid up-scaling, reduction of life cycle cost and utilisation of capabilities and c) flexibility and cost competitiveness to serve multiple markets such as automotive and consumer products. 			

Technology Strategy Board

Driving Innovation

The project brings together a consortium of all relevant supply chain partners supported by world leading Universities (University College London and Imperial College London) and the High Speed Sustainable Manufacturing Institute.

The project partners will aim to reach MRL4 and parts of MRL5 within the project.