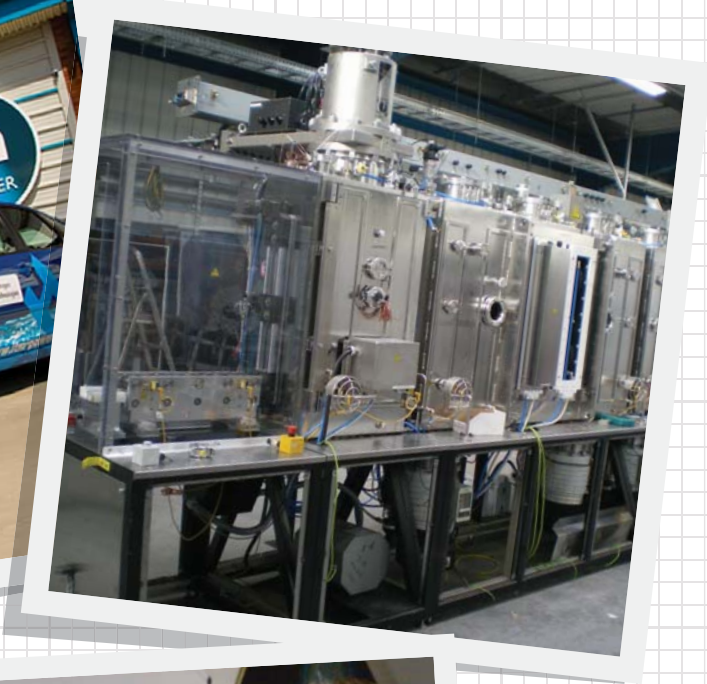


Lower cost electrode coatings for hydrogen production



Using electricity from renewable sources to power hydrogen production equipment (electrolysers) could be very important for the future growth of a low carbon economy in the UK. However, the electrodes used in electrolysers have to be made from precious metals so they can withstand the aggressive chemical environment. Developing an alkaline polymer material and efficient methods of applying a thin-film coating to a lower-cost, base electrode material would reduce the need for precious metals, making electrode production less costly.



Technology Strategy Board

Driving Innovation

In this collaborative project, Teer Coatings Ltd aims to develop durable thin-film coatings for electrode surfaces. The electrodes will then be used in an alkaline electrolyser developed by ITM Power plc.

Potential benefits

- Low-cost electrode design could transform the economics of hydrogen production using renewable energy.
- Possible cost savings in electrode fabrication by using coatings to maximise electrode efficiency, in combination with lower-cost electrode support materials.
- Increased productivity with an 'in-line' system where the electrodes are automatically transported, from and to atmospheric pressure, through a programmed sequence of vacuum coating processes.
- In-line production relevant to future coatings for fuel-cell and photovoltaic components.

Innovative ways of working

Teer Coatings produces advanced vacuum-deposited surface coatings, mainly using its own variant of the magnetron sputtering process. Its current equipment is based on batch processing in individual vacuum chambers. While ideal for single items or batches with thousands of components (depending on size), efficiencies can be dramatically improved by moving to an 'in-line' system. Addition of load locks (ie dedicated inlet and outlet chambers equipped with high-capacity vacuum pumps) to bring components in and out of the vacuum system would result in semi-continuous processing. Teer Coatings has acquired a second-hand industrial in-line system that will be used to demonstrate the 1,000 m² per year initial coating requirement for the new electrode design.

Market potential

The existing electrolyser market is worth \$125 million and is expected to expand considerably as new hydrogen applications emerge in the transport and built environment sectors. The availability of efficient, low-cost electrodes suitable for the volume production of electrolyser technology is one key step towards cost reduction. This will help the economic justifications for early adopters to implement 'green' hydrogen solutions and accelerate rates of manufacture in the next few years. If successful, low-cost electrolyser solutions will underpin a potential green hydrogen market worth several billion dollars by 2020.



'The coatings exhibit very good resistance to the high pH in our developmental alkaline electrolyser. In-line coatings could significantly reduce the cost of this component.'

Dr Graham Cooley, CEO, ITM Power

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Project number 100804

Duration 36 months – ends July 2011

Technology Strategy Board investment
£1.3 million

Total project cost £2.45 million

Current project partners

ITM Power plc
Teer Coatings Ltd
Pera
Southampton University
Boddingtons Technical Plastics Ltd

Collaborative research and development projects are one of the tools that the Technology Strategy Board uses to drive innovation in the UK. The Technology Strategy Board is a business-led executive non-departmental public body, established by the Government. Its role is to promote and support research into, and development and exploitation of, technology and innovation for the benefit of UK business, in order to increase economic growth and improve the quality of life. It is sponsored by the Department for Business, Innovation and Skills (BIS).

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