MIT improves fuel cell output 50 percent

An improved fuel cell, developed by MIT engineers, not only delivers 50 percent greater output, but is also substantially cheaper than older counterparts.

'Our goal is to replace traditional fuel-cell membranes with these cost-effective, highly tunable and better-performing materials,' said Paula T. Hammond, who led the research team.

The Massachussetts Institute of Technology (MIT) team focussed on direct methanol fuel cells (DMFCs), in which the methanol is directly used as the fuel and reforming of alcohol down to hydrogen is not required.

Such a fuel cell is attractive because the only waste products are water and carbon dioxide. Also, because methanol is a liquid, it is easier to store and transport than hydrogen gas, and is safer because it won't explode.

Methanol also has a high energy density - a little goes a long way, making it especially interesting for portable devices.

The DMFCs currently on the market have limitations. For example, the material currently used for the electrolyte sandwiched between the electrodes is expensive.

More importantly a material, known as Nafion, is permeable to methanol, allowing some of the fuel to seep across the centre of the fuel cell. This wastes fuel and lowers the efficiency of the cell.

Using a relatively new technique known as layer-by-layer assembly, the MIT researchers created an alternative to Nafion. 'We were able to tune the structure of (our) film a few nanometres at a time,' Hammond said, getting around some of the problems associated with other approaches.

The team is now exploring whether the new film could be used by itself, completely replacing Nafion. To that end, they have been generating thin films that stand alone, with a consistency much like plastic wrap.

The findings of the study have been published in the latest issue of the journal Advanced Materials.

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