

Researchers discover a way to significantly reduce the production costs of fuel cells

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Researchers at Aalto University in Finland have developed a new and significantly cheaper method of manufacturing fuel cells. A noble metal nanoparticle catalyst for fuel cells is prepared using atomic layer deposition (ALD). This ALD method for manufacturing fuel cells requires 60 per cent less of the costly catalyst than current methods.

"This is a significant discovery, because researchers have not been able to achieve savings of this magnitude before with materials that are commercially available," says Docent Tanja Kallio of Aalto University.

Fuel cells could replace polluting [combustion engines](#) that are presently in use. However, in a fuel cell, [chemical processes](#) must be sped up by using a [catalyst](#). The high price of catalysts is one of the biggest hurdles

to the wide adoption of fuel cells at the moment.

The most commonly used fuel cells cover [anode](#) with expensive noble metal powder which reacts well with the fuel. By using the Aalto University researchers' ALD method, this cover can be much thinner and more even than before which lowers costs and increases quality.



A noble metal nanoparticle catalyst for fuel cells is prepared using atomic layer deposition. This ALD method for manufacturing fuel cells requires 60 per cent less of the costly catalyst than current methods. Credit: Adolfo Vera

With this study, researchers are developing better alcohol fuel cells using methanol or ethanol as their fuel. It is easier to handle and store alcohols than commonly used hydrogen. In alcohol fuel cells, it is also possible to use palladium as a catalyst. The most common catalyst for hydrogen fuel cells is platinum, which is twice as expensive as palladium. This means that alcohol fuel cells and palladium will bring a more economical product to the market.

Fuel cells can create electricity that produces very little or even no pollution. They are highly efficient, making more energy and requiring less fuel than other devices of equal size. They are also quiet and require

low maintenance, because there are no moving parts.

In the future, fuel cells are expected to power electric vehicles and replace batteries, among other things. Despite their high price, fuel cells have already been used for a long time to produce energy in isolated environments, such as space crafts. These results are based on preliminary testing with [fuel cell](#) anodes using a palladium catalyst. Commercial production could start in 5-10 years.

This study was published in the *Journal of Physical Chemistry C*.

More information: Atomic Layer Deposition Preparation of Pd Nanoparticles on a Porous Carbon Support for Alcohol Oxidation. The *Journal of Physical Chemistry C*, 2011, 115, 23067–23073. [dx.doi.org/10.1021/jp2083659](https://doi.org/10.1021/jp2083659)

Provided by Aalto University

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