

Researchers drive towards cheaper fuel cells for electric cars

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A million electric cars could be on roads across North America before the end of the decade with the help of research by the United States Department of Energy, Los Alamos National Laboratory and the University of Waterloo.

Professor Zhongwei Chen is part of a team led by the Los Alamos National Laboratory looking to develop non-[precious materials](#) to replace the expensive [platinum catalysts](#) in fuel cells.

"One of the biggest barriers to the adoption of fuel cells in vehicles is the cost of the units. The pure platinum needed for the catalysts in the cells contributes about 40 per cent of the total cost," said Professor Chen, of Waterloo's Faculty of Engineering. "Platinum is so expensive, and is obviously a limited resource, we have to find a way to replace it if [fuel cell](#) cars are going to succeed."

An average fuel cell car requires about 30 grams of pure platinum to produce enough power to make them run and will last for around 150,000 kilometres. That amount of platinum is around \$4,000 at current prices.

"Here at Waterloo we are using nanotechnology to create advanced non-precious alternatives for platinum that are a fraction of the cost of platinum and yet provide comparable durability," said Professor Chen who is also a member of the Waterloo Institute for Nanotechnology. "If we can find a suitable alternative to platinum, it could help pave the way

for the motor industry to adopt [hydrogen fuel cells](#) for more than a million new vehicles by the end of the decade."

[Fuel cell vehicles](#) have the potential to significantly reduce dependence on oil for transportation and lower [pollution levels](#) as they produce no [greenhouse gases](#) from their exhaust. However, the vehicles are currently too expensive and not durable enough to compete with conventional cars or hybrids.

The U.S. Department of Energy estimates that platinum-based catalysts need to use roughly four times less platinum than is used in current fuel cell designs in order to represent a realistic alternative to internal combustion engines. Eliminating the [platinum](#) completely, which is the target of Professor Chen's research, would be a major accomplishment.

Uniquely for a Canadian institution, the research is supported by a three-year grant of \$4 million from the U.S. Department of Energy. Other members of the team led by the Los Alamos National Laboratory are Carnegie Mellon University, the University of Rochester and Oak Ridge National Laboratory, along with industrial partners - IRD Fuel Cells Inc. and General Motors Corporation.

"The Department of Energy Hydrogen Program supports research and development that has substantially improved the state-of-the-art in fuel cell technology, especially with technical challenges to fuel cells," said Professor Chen.

The partnership also allows Waterloo graduate students to get involved with Los Alamos, one of the leading research institutions in the world. PhD student Drew Higgins will be the first student based out of Los Alamos from this coming January.

"It's very difficult for non-American institutions to be directly involved

in U.S. [Department of Energy](#) funded projects and be provided the valuable opportunity to collaborate with the Los Alamos National Laboratory," said Higgins. "There's so much focus on this technology by researchers in America, Canada, Germany, Japan, Korea and China. It's thrilling to get the opportunity to work with world-leading experts as we try to find ways to make fuel cells a viable option for the auto industry in the near future."

Provided by University of Waterloo

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