Chinese scientists boost output of hydrogen fuel cells fourfold

South China Morning Post, Sept 11, 2026

Scientists in China have developed a way to generate a fourfold increase in power output of hydrogen fuel cells, an advance that could broaden their use in areas from road vehicles to space missions.

Hydrogen is widely viewed as a promising clean energy source for a low-carbon future. Fuel cells convert the chemical energy in hydrogen directly into electricity, producing water as their only exhaust. In a study published in the peer-reviewed journal *Science* on September 10, researchers at the Beijing Institute of Technology reported a major advance in proton-exchange membrane fuel cells (PEMFCs), the type already used in many hydrogen-powered vehicles.

PEMFCs operate at relatively low temperatures, generally between 60 and 80 degrees Celsius. They can convert about 50 to 60 per cent of the energy in their hydrogen fuel into electricity. The process is straightforward, involving electrons flowing through an external circuit, generating electricity. The bottleneck lies in the speed at which protons can move through the catalyst layer, the part of the fuel cell where chemical reactions take place. For years, industry-standard materials such as Nafion have tended to form tightly packed structures at the nanoscale when mixed with catalysts. This can slow proton transport and limit the cell's efficiency.

The Chinese team took a different approach, designing a new interface that works like a relay race. Instead of travelling directly to the catalyst surface, protons hop between intermediate "islands". This arrangement greatly speeds the movement of protons.

Under standard operating conditions, the new fuel-cell design produced four times as much power as conventional designs, while using only a small amount of platinum, the expensive catalyst commonly needed in hydrogen fuel cells. The new design also showed encouraging durability. After 30,000 operating cycles, it retained 63 per cent of its initial peak power, compared with just 30 per cent for conventional systems.

The researchers say the improvements could be especially valuable in demanding applications such as space missions using liquid oxygen, where fuel-cell efficiency depends heavily on how effectively protons move through the device.

The breakthrough comes as China's production of hydrogen expands. By the end of 2025, the country's production capacity exceeded 51 million tonnes a year, while China accounted for 53 per cent of renewable-energy-powered hydrogen projects based on electrolysis. According to *China Electric Power News* in August, more than 130 fuelcell power plants were operating in the country by 2025, with combined installed capacity exceeding 30 megawatts. More than 20 long-distance hydrogen pipelines are also planned nationwide.

Beijing's 2026 government work report named hydrogen a "new growth point" for the first time. Passenger fuel-cell vehicles remain far less common than battery-electric cars, but official backing remains strong.

The country had about 32,000 fuelcell vehicles on the roads at the end of 2025. In March 2026, three central government ministries set a target of 100,000 such vehicles by 2030. They also called for cutting the retail price of hydrogen from more than 30 yuan per kilogram to below 25 yuan.

That is considered the price point at which hydrogen-powered heavy trucks would become cheaper to operate than diesel models over their full life cycle, including purchase, fuel and maintenance costs. However, substantial hurdles remain. Researchers need to show that the technology can be manufactured at industrial scale, kept affordable and validated for long-term safety.