



CASE STUDY

Nanotechnology innovation in biofuels production

Nanotechnology is changing what is possible

across a range of industries. We are already benefiting from innovations based on our ability to structure matter at the molecular level, from ever faster and smaller computers to antibacterial clothing.

Nanotechnology is also transforming what can be achieved by chemical catalysts—materials that facilitate chemical reactions by making them faster and less energy-intensive. **By combining traditional catalysts with special nanocomposite support structures, new catalysts can be made which are more efficient**

and more active. These new nanocomposite catalysts can improve a range of industrial processes we rely on every day, allowing us to make more, from less, and faster.

The production of liquid transport fuels (petrol and diesel) from natural gas, coal and biomass relies on the catalyst-dependent Fischer-Tropsch process. Current Fischer-Tropsch reactors are energy-intensive and only economically viable in large refineries. New highly active catalysts will make refineries more efficient and allow the miniaturisation of Fischer-Tropsch reactors. Miniaturised reactors could enable the production of fuel in remote or otherwise inaccessible locations in Australia and India.

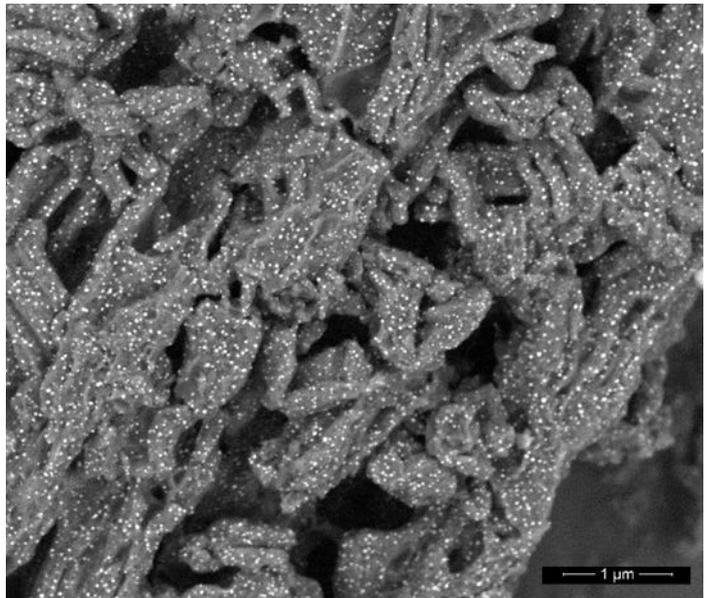


Image: Microscopic view of the new nanocomposite catalyst

Australia-India Strategic Research Fund

A team at the CSIRO, led by Dr Ken Chiang, has been busy developing new nanocomposite catalysts. But they needed help to test the new catalysts' real-world performance. So they partnered with the Indian Institute of Petroleum (IIP) with funding support from the Australia-India Strategic Research Fund. The project brought together CSIRO's state-of-the-art nanotechnology capabilities and the IIP's fuel testing expertise with the aim of developing industry-ready nanocomposite catalysts.

The IIP has put the CSIRO's new nanocomposite catalysts through a series of practical tests, aiding the transformation of bio-oils. The new nanocomposite catalysts are performing well, successfully producing more fuel from bio-oil than a standard catalyst. The CSIRO team has also developed an optimised procedure for manufacturing their nanocomposite catalysts.

Relative to earlier techniques the new catalyst synthesis procedure is 20 times more efficient, and eliminates toxic by-products. This allows production of the catalysts to be scaled up, reducing their cost and opening the door to commercialisation.

Through the practical testing it has been discovered that the nanocomposite catalysts are also effective for a number of other chemical reactions, including the conversion of carbon dioxide into methanol. The CSIRO is exploring opportunities with commercial partners to bring their nanocomposite catalysts to industry.

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To find out more

For more information on the Australia-India Strategic Research Fund, visit www.science.gov.au/aisrf.