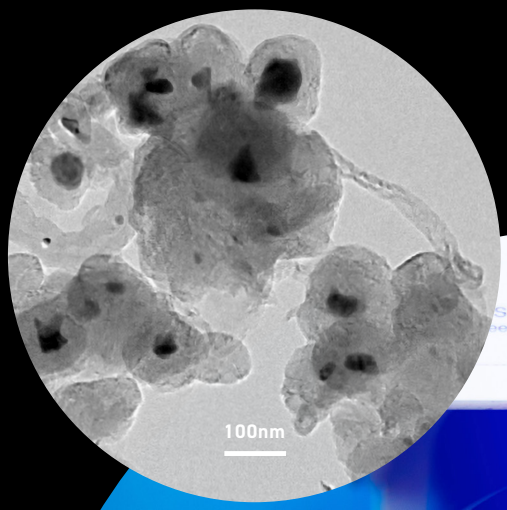
# TURNING METHANE INTO CLEAN FUEL

MICROSCOPY AUSTRALIA

BIG IMPACT

SMALL SAMPLE

Commercialisation of an exciting new process that splits methane into hydrogen and graphite has allowed HAZER® group to access a global market worth over US$100 billion.







*Micrograph: TEM image of carbon nano-onions encapsulating catalyst particles by A/Prof. Martin Saunders*

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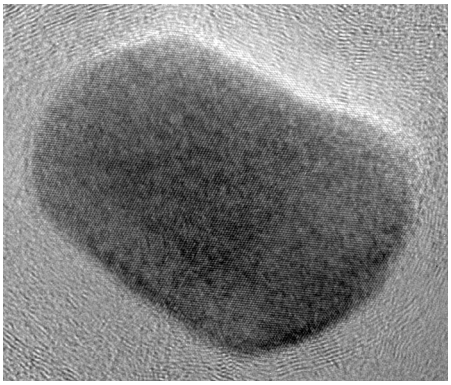

*High res TEM image of a catalyst particle showing the atomic structure*

## CHALLENGE

**Hydrogen itself is a clean fuel but current production technologies are significant producers of carbon pollution. It has great potential as a low-carbon energy source for electricity, heating, hydrogen vehicles and long-distance energy transport. Once burnt, it's only by-product is water. However, until it can be produced cleanly, it will not be a viable green alternative to fossil fuels.**

## RESEARCH

The HAZER® Process was developed at the University of Western Australia and splits methane into hydrogen and graphite using iron ore as a catalyst. This turns methane, a significant greenhouse gas and abundant natural resource, into hydrogen, a source of clean energy. The graphite is also a valuable industrial commodity.

Advanced microscopy by A/Prof. Martin Saunders allowed the cracking process, and the nanomaterials it produced, to be understood. The HAZER® Process produces economically competitive hydrogen with at least 50% fewer emissions than alternative fossil fuel-based hydrogen production.

The nano-structured graphite forms as self-encapsulating carbon spheres called carbon nano-onions. These don't contribute to atmospheric carbon and can be used in everything from hydrogen fuel cells to environmental remediation, capacitors, lithium-ion batteries and much more. The graphite also shows promise for biomedical applications.

## IMPACT

**2010** — HAZER® Group is formed to commercialise the economically competitive HAZER Process and take advantage of a global market worth over US$115 billion

**2015** — Launched on the ASX and received funding to develop a pilot plant to produce ultra-high-purity graphite in Kwinana, WA

**2019** — Ongoing R&D investigating the use of graphite in applications including Li-ion batteries, water purification, and additives for lubrication products supported by $800,000 grant from IMCRC

**2019** — BOC Ltd. agrees to supply storage, logistics and refuelling services to deliver hydrogen to end users from a proposed Commercial Demonstration Plant

**2020** — A successful feasibility study leads to $9.4 million in government funding to support the construction of the HAZER Commercial Demonstration Plant

**2020** — HAZER team up with the WA state government to turn methane from wastewater treatment into 100 tonnes of fuel-grade hydrogen and 380 tonnes of graphite each year

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