Better oxygen extraction attracts commercial interest

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The membrane technology will improve selective chemical reactions like in the first step of converting natural gas into liquid fuels. Credit: Shell

Developing highly efficient ion transport membranes for the extraction of oxygen for industrial and medical use has earned a team of Curtin University scientists first prize in the university's Commercial Innovation Awards.

The team was applauded for its innovation in producing a mechanically strong and durable membrane structure, designed to speed up the rate of oxygen extraction from gas or liquid mixtures.

The new process is dramatically different from others and represents a more economical approach to making oxygen in steel-making, medicine,

the production of liquid fuels and more environmentally friendly combustion of fossil fuels.

Curtin's director of IP Commercialisation Rohan McDougall estimates the oxygen extraction process is a global business worth about $20 billion annually but existing membrane-based processes are too slow and therefore not commercially viable.

Winning team member Gordon Parkinson says the first application of the new technique will be to separate oxygen from air in a more efficient way than currently possible.

"This can be extended to use the oxygen that travels through our membranes in a controllable way to carry out very selective chemical reactions, such as the first step in converting natural gas into liquid fuels," he says.

"The oxygen can even be taken from other molecules such as water and carbon dioxide, allowing important materials to be made from such feedstocks, by using renewable energy to power the reactions.

"In even broader applications, the chemistry of the membranes can be tailored to conduct other ions, such as sodium, for use in batteries and environmental remediation."

Prof Parkinson says the team undertook the work over two years as part of a broader theme of developing conducting materials for use in the generation and storage of clean energy.

He says the slow rate of transfer of oxygen (flux) through existing ceramic membranes prevented them being commercially viable, so they adopted an innovative approach to solve the problem.

"We are keen to talk to industry as potential partners to develop commercial applications and are already in discussion with some companies and have been approached by others as a direct result of our winning the award."

Runner-up in the Innovation Awards was a team lead by Matthew Oldakowska which developed a spine stabilisation implant to treat neck pain and is unique since it maintains some movement in the stabilised spine section.

It eliminates the need for fusion procedures, thereby reducing trauma, surgical complications and cost.

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