Capturing carbon with clever trapdoors

The University of Melbourne

A team of Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC) researchers based at the University of Melbourne have developed a novel method of capturing carbon dioxide that will reduce the cost of separating and storing the gas.

The quest to capture carbon dioxide is crucial to a cleaner future and once captured, carbon dioxide can be compressed and safely stored. It is also a useful source for chemical manufacture. However, current processes are inefficient and require several stages of refining and extraction before a pure form of carbon dioxide is produced.

One method of capturing carbon dioxide is through molecular sieve, an ultra-fine filter system that captures a variety of molecules but that needs further filtering.

Professor Paul Webley and his team including PhD student Jin Shang and research Fellow Gang Li from the Melbourne School of Engineering, have developed a new sieve that allows carbon dioxide molecules to be trapped and stored.

“The findings published in the Journal of the American Chemical Society suggest that this new material has important applications to natural gas purification. Many natural gas fields contain excess carbon dioxide that must be removed before the gas can be liquefied and shipped, Professor Webley said.

“Because the process allows only carbon dioxide molecules to be captured, it will reduce the cost and energy required for separating carbon dioxide. The technology works on the principle of the material acting like a trap-door that only allows certain molecules to enter, he said.

Once entered, the trapdoor closes and the carbon dioxide molecules remain,” said Professor Webley.

“We took a collaborative approach to this research with input from CSIRO, the Department of Materials Engineering and Mechanical Engineering at Monash University and the Australian Synchrotron.

We have a new material that is able to separate carbon, dioxide from any given stream such as power stations and from natural gas sources. While we can’t change industry in a hurry, we have provided a viable bridging solution.”

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