Powder could help cut CO2 emissions

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Scientists at the University of Waterloo have created a powder that can capture CO_2 from factories and power plants.

The powder, created in the lab of Zhongwei Chen, a chemical engineering professor at Waterloo, can filter and remove CO_2 at facilities powered by fossil fuels before it is released into the atmosphere and is twice as efficient as conventional methods.

Chen said the new process to manipulate the size and concentration of pores could also be used to produce optimized carbon powders for applications including water filtration and energy storage, the other main strand of research in his lab.

"This will be more and more important in the future," said Chen, "We have to find ways to deal with all the CO_2 produced by burning fossil fuels."

CO_2 molecules stick to the surface of carbon when they come in contact with it, a process known as adsorption. Since it is abundant, inexpensive and environmentally friendly, that makes carbon an excellent material for CO_2 capture. The researchers, who collaborated with colleagues at several universities in China, set out to improve adsorption performance by manipulating the size and concentration of pores in carbon materials.

The technique they developed uses heat and salt to extract a black carbon powder from plant matter. Carbon spheres that make up the powder have many, many pores and the vast majority of them are less than one-millionth of a metre in diameter.

"The porosity of this material is extremely high," said Chen, who holds a Tier 1 Canada Research Chair in advanced materials for clean energy. "And because of their size, these pores can capture CO_2 very efficiently. The performance is almost doubled."

Once saturated with carbon dioxide at large point sources such as fossil fuel power plants, the powder would be transported to storage sites and buried in underground geological formations to prevent CO_2 release into the atmosphere.

A paper on the CO_2 capture work, In-situ ion-activated carbon nanospheres with tunable ultramicroporosity for superior CO_2 capture, appears in the journal *Carbon*.

Provided by University of Waterloo