

TECHNOLOGY OPPORTUNITY

Novel Sorbent Material and Method for CO₂ Gas Capture

A novel silica fibrous nanospheres functionalized through an amination process for CO₂ gas capture

A one-step thermal process (ammonolysis) has been developed to produce solid amine-grafted silica sorbent for CO₂ capture. The grafting technique is simple and does not involve the use of expensive and toxic chemicals. The technique produces not only "green" but very robust highly stable sorbent material at high temperatures and different atmospheres. Unlike conventional organic amine-grafted silica products, the high mechanical strength of this sorbent allows its regeneration and multiple use for CO₂ capture. Our data, so far, has demonstrated up to 5 cycles of CO₂ gas capture with no deterioration in the sorbent's morphology or performance. The CO₂ adsorption on this silica nanosphere sorbent material has shown fast kinetics with complete uptake of CO₂ in less than 2 minutes. This technology provides a sustainable solution in capturing CO₂ thus allowing use of fossil fuel with reduced CO₂ emissions.



Benefits

- ▲ **Simple and Cost Effective:** One-step production process with no expensive chemicals required
- ▲ **Environmentally Friendly:** No toxic agents required
- ▲ **Robust:** High thermal stability in inert and oxidative environments
- ▲ **Long Service Life:** Excellent mechanical strength, easy regeneration, and long lifetime (up to 5 cycles of CO₂ capture)
- ▲ **Fast Kinetics:** High rate of CO₂ adsorption and desorption

Applications

- ▲ Gas Capture - (CO₂-containing gas streams)
- ▲ CO₂ emission reduction
- ▲ Petroleum industry
- ▲ Thermal power plant

Opportunity

This technology is part of KAUST's technology commercialization program that seeks to stimulate development and commercial use of KAUST-developed technologies.

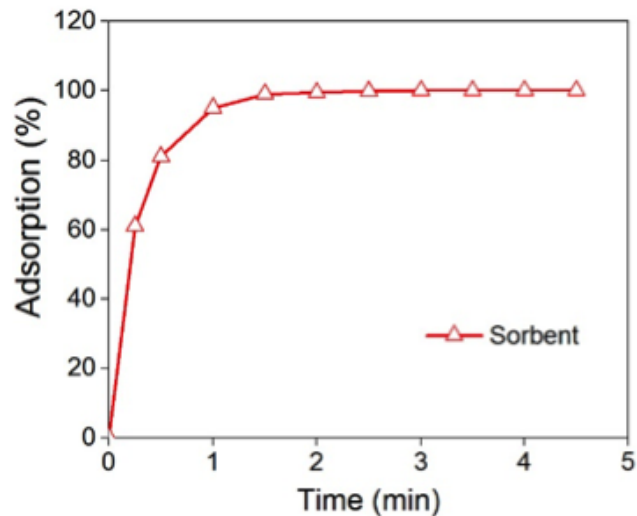
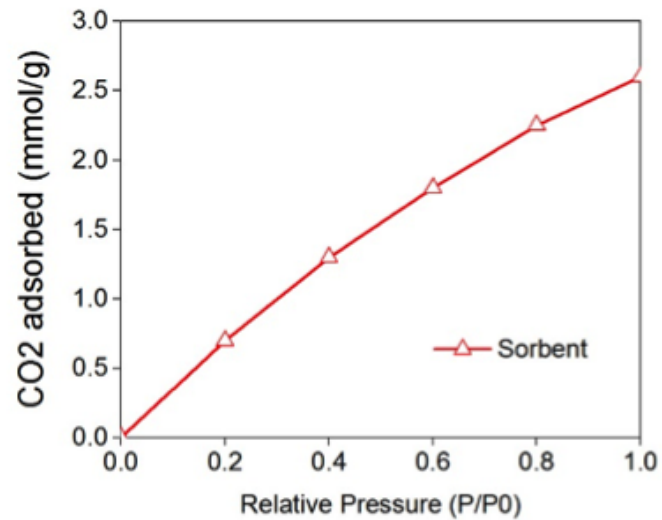
Opportunities exist for joint development, patent licensing, or other mutually beneficial relationships.

For More Information

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Technology Details



Diagrams showing increasing CO₂ adsorption capacity with increased pressure using this silica nanosphere sorbent material (Top) and the ability of the sorbent material for quick adsorption of CO₂ (Bottom).

IP Protection

KAUST has an issued patent US 13/709,155 for this technology.



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