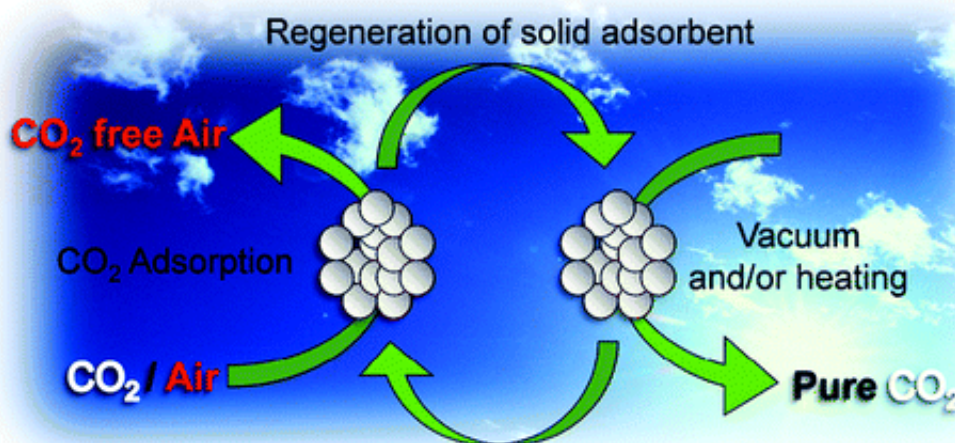


New materials remove CO₂ from smokestacks, tailpipes and even the air

January 4 2012



Scientists are reporting discovery of an improved way to remove carbon dioxide — the major greenhouse gas that contributes to global warming — from smokestacks and other sources, including the atmosphere. Their report on the process, which achieves some of the highest carbon dioxide removal capacity ever reported for real-world conditions where the air contains moisture, appears in the *Journal of the American Chemical Society*.

Alain Goeppert, G. K. Surya Prakash, chemistry Nobel Laureate George A. Olah and colleagues explain that controlling emissions of [carbon](#)

[dioxide](#) (CO₂) is one of the biggest challenges facing humanity in the 21st century. They point out that existing methods for removing carbon dioxide from smokestacks and other sources, including the atmosphere, are energy intensive, don't work well and have other drawbacks. In an effort to overcome such obstacles, the group turned to solid materials based on polyethylenimine, a readily available and inexpensive polymeric material.

Their tests showed that these inexpensive materials achieved some of the highest carbon dioxide removal rates ever reported for humid air, under conditions that stymie other related materials. After capturing carbon dioxide, the materials give it up easily so that the CO₂ can be used in making other substances, or permanently isolated from the environment. The capture material then can be recycled and reused many times over without losing efficiency. The researchers suggest the [materials](#) may be useful on submarines, in smokestacks or out in the open atmosphere, where they could clean up carbon dioxide pollution that comes from small point sources like cars or home heaters, representing about half of the total CO₂ emissions related to human activity.

More information: Carbon Dioxide Capture from the Air Using a Polyamine Based Regenerable Solid Adsorbent, *J. Am. Chem. Soc.*, 2011, 133 (50), pp 20164–20167. [DOI: 10.1021/ja2100005](https://doi.org/10.1021/ja2100005)

Abstract

Easy to prepare solid materials based on fumed silica impregnated with polyethylenimine (PEI) were found to be superior adsorbents for the capture of carbon dioxide directly from air. During the initial hours of the experiments, these adsorbents effectively scrubbed all the CO₂ from the air despite its very low concentration. The effect of moisture on the adsorption characteristics and capacity was studied at room temperature. Regenerative ability was also determined in a short series of adsorption/desorption cycles.

Provided by American Chemical Society

Citation: New materials remove CO₂ from smokestacks, tailpipes and even the air (2012, January 4) retrieved 2 May 2024 from <https://phys.org/news/2012-01-materials-co2-smokestacks-tailpipes-air.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.