

Review of moisture swing sorbents for carbon dioxide capture from ambient air

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Progress has been made recently in carbon capture technology that might allow us to efficiently absorb carbon dioxide directly from the air and perhaps halt the rise of atmospheric concentrations of the greenhouse gas. The development of moisture swing sorbents as a technology in this

area is discussed in an article [published](#) in the *International Journal of Global Warming*.

The benefit when compared with conventional approaches is that such sorbents use water as their primary energy source and so themselves can be [carbon neutral](#) in mitigating climate change.

Conventional moisture swing sorbents, or humidity swing sorbents, can adsorb or desorb water vapor from the atmosphere. These materials "swing" from one behavior to the other reversibly depending on humidity or moisture levels. Moisture swing sorbents used for carbon dioxide capture sees related materials adsorb carbon dioxide from their surroundings when they are dry but when they get wet, they release, or desorb, the gas.

Weishu Wang, Xiangxin Zhang, Jun Liu, Chenyang Liang, Jingzun Niu, and Feiyue Wang of the North China University of Water Resources and Electric Power in Henan, China, have reviewed research in this area spanning more than two decades. They focus their review on how the adsorption capacity of moisture swing sorbents for large-scale applications might be reviewed. The team looked at how sorbents have been prepared. They also identified the various factors that affect carbon dioxide adsorption and desorption performance.

Materials for moisture swing sorbents fall into two categories: resin and non-resin materials. While resin materials offer faster adsorption rates and are easier to prepare, non-resin materials offer greater carbon dioxide adsorption capacity. The review suggests that the reliance on resin materials is currently a limitation which suggests that there is an urgent need for diversification in materials choice.

The application of carbon dioxide adsorbents is not limited to atmospheric absorption. There are many closed environments, such as

submarines and spacecraft, and enclosed crop production environments where the level of carbon dioxide needs to be controlled precisely.

The [review](#) suggests that moisture swing sorbents represent a promising avenue for [carbon dioxide](#) capture. Ongoing research will help diversify [raw materials](#), lead to the optimization of preparation methods, and explore innovative technologies for enhanced performance and broader applications, as well as in addressing climate change.

More information: Weishu Wang et al, Review of moisture swing sorbents for carbon dioxide capture from ambient air, *International Journal of Global Warming* (2024). [DOI: 10.1504/IJGW.2024.135979](https://doi.org/10.1504/IJGW.2024.135979)

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