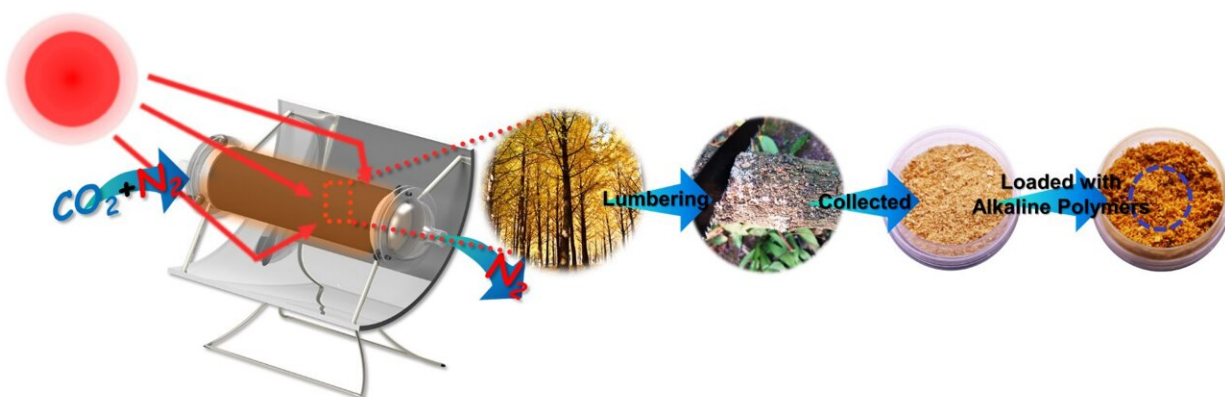


Scientists use sunlight and modified sawdust to reversibly capture carbon dioxide

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How the sunlight-controlled CO₂ separation installation works. Credit: Shiming Zhang, Renmin University of China.

According to the World Meteorological Organization, greenhouse gas concentrations have reached a record high. In the case of carbon dioxide (CO₂), the growth in 2020 exceeded the average for the last decade; despite a 5.6% drop in fossil fuel CO₂ emissions driven by COVID-19 restrictions. This continued rise in CO₂ concentration is directly linked to our massive consumption of fossil fuels.

In a study published in the journal *Green Energy & Environment*, a group of researchers from Renmin University of China propose a new method to capture CO₂ using sunlight as the energy source and modified sawdust

as the CO₂ absorbent. In addition to capturing CO₂, their method also avoids using the [fossil fuels](#) that would create additional CO₂.

Importantly, the absorption method they have developed is reversible, so the captured CO₂ can be used to generate other products, such as methanol, ethanol and methane.

Corresponding author Yapei Wang, a professor in the university's Department of Chemistry, explains that "while a large number of high-performing CO₂ absorbents have been developed in recent decades, people rarely pay attention to the carbon emitted by the adsorbent during its preparation. Moreover, typical industrial CO₂ capture systems show high-energy consumption during the absorber regeneration process.

"To solve these issues, we focused on a solution that not only fabricates low-energy consumption CO₂ absorbents, it also uses sunlight as the single energy input to regenerate those absorbents."

The research team found that sawdust impregnated with an aqueous solution of amine-based polymer was an easy-to-obtain CO₂ absorbent with two important advantages: it doesn't require complicated synthesis, and it can capture CO₂ and be regenerated by proper heating. In addition, a reflector and sunlight absorption layer was used to fabricate the sunlight harvesting systems, heating up the modified sawdust for CO₂ capture.

According to Shiming Zhang, a Ph.D. student who took part in the study, "we were inspired by solar water heaters. Using [sunlight](#) as an energy input minimizes the need for traditional [energy](#) and is more environmentally-friendly." Postgraduate Qianhao Pan, who also participated in the research, adds that they "believe less is more, sometimes a simple preparation process can lead to an effective solution that protects the environment."

More information: Shiming Zhang et al, Sunlight-controlled CO₂ separation resulting from a biomass-based CO₂ absorber, *Green Energy & Environment* (2021). [DOI: 10.1016/j.gee.2021.09.001](https://doi.org/10.1016/j.gee.2021.09.001)

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