Small chemical tweak boosts CO_2 capture by 15%

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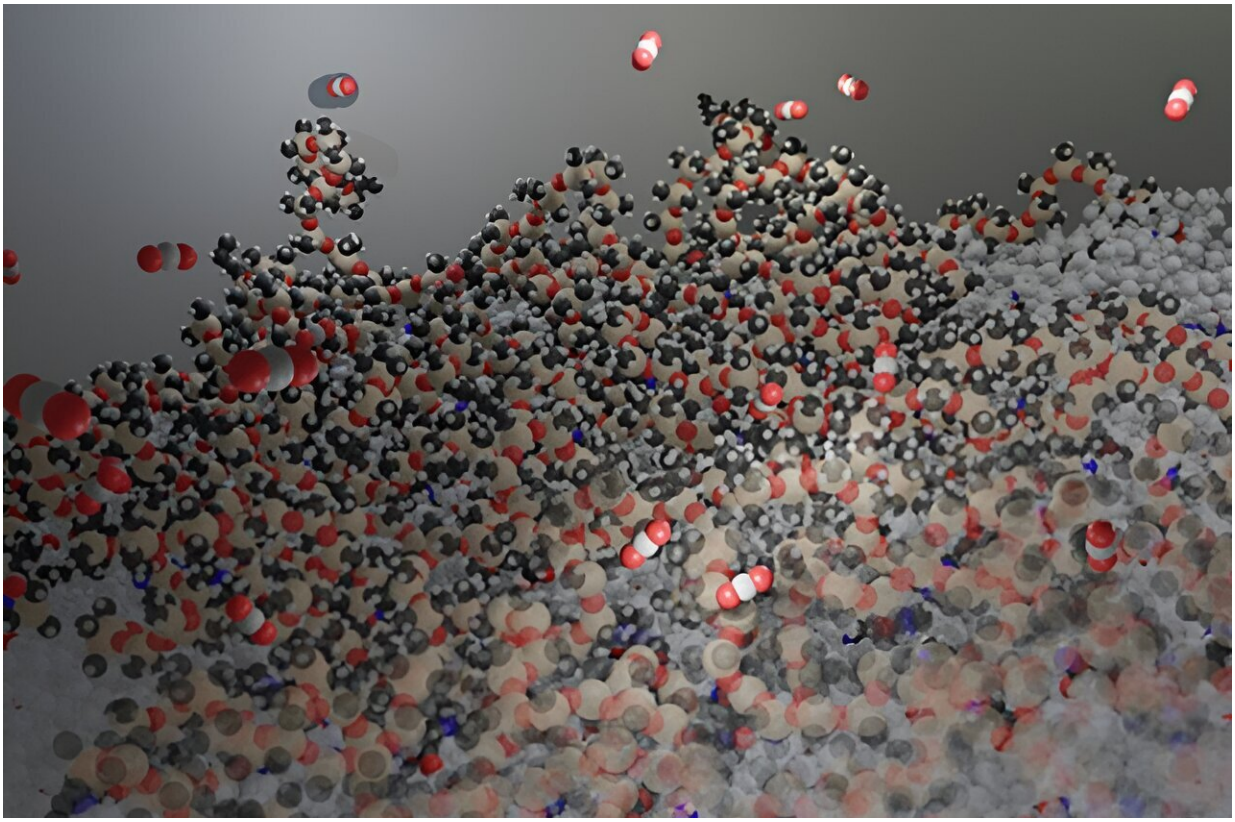

Environmentally friendly amino acids react readily with CO_2 to accelerate direct air capture rates. Credit: Benjamin Doughty/ORNL, U.S. Dept. of Energy

Researchers at Oak Ridge National Laboratory have demonstrated that small molecular tweaks to surfaces can improve absorption technology

for direct air capture, or DAC, of carbon dioxide.

Amino acids, which react readily with CO_2 and are environmentally friendly, have potential for use in liquid-based DAC. However, they aren't naturally drawn to surfaces where they might interact with environmental CO_2.

A team from ORNL added a charged polymer layer to an amino acid solution, and then, through spectroscopy and simulation, found that the charged layer can hold amino acids at its surface.

The paper is published in the journal *ACS Applied Materials & Interfaces*.

The surface-bound amino acids accelerated CO_2 capture by 15%. "It's exciting to see that such a small change to an interface can make such a huge difference," said ORNL's Uvinduni Premadasa.

"Once you saturate the solution, you need to regenerate the materials and interfaces," ORNL's Benjamin Doughty said. The researchers are now exploring energy-efficient ways to exchange surface sorbent materials.

More information: Uvinduni I. Premadasa et al, Synergistic Assembly of Charged Oligomers and Amino Acids at the Air–Water Interface: An Avenue toward Surface-Directed CO2 Capture, *ACS Applied Materials & Interfaces* (2024). DOI: 10.1021/acsami.3c18225

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