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New Materials May Aid in Capturing Carbon

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To sequester carbon dioxide as part of any climate-change mitigation strategy, the gas first has to be captured from the flue at a power plant or other source. The next step is just as important: the CO2 has to be released from whatever captured it so that it can be pumped underground or otherwise stored for the long term.

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That second step can be costly from an energy standpoint. Materials currently used to capture CO2 have to be heated to release the gas.

But chemists at the University of California, Los Angeles, say that a new class of materials they developed called metal-organic frameworks, or MOFs, hold promise for carbon capture. In a paper in The Proceedings of the National Academy of Sciences, Omar M. Yaghi and colleagues describe the performance of one MOF, which they say can release most of the CO2 it captures at room temperature.

Dr. Yaghi described a metal-organic framework as a “crystalline sponge,” a hybrid lattice of organic compounds and metal atoms that has a huge internal surface area where gas molecules can be absorbed. The MOF used in the study contains magnesium atoms, “which make just the right environment for binding carbon dioxide,” he said.

In experiments, the material separated out CO2 while allowing methane to pass. What was really surprising, though, was that at room temperature 87 percent of the CO2 could be released. And if desired, the remaining 13 percent could be liberated by heating to about 175 degrees Fahrenheit, far lower than temperatures currently required.

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