New metal–organic framework can take on toxic sulfur dioxide gas

November 4 2019, by Glenn Roberts Jr.

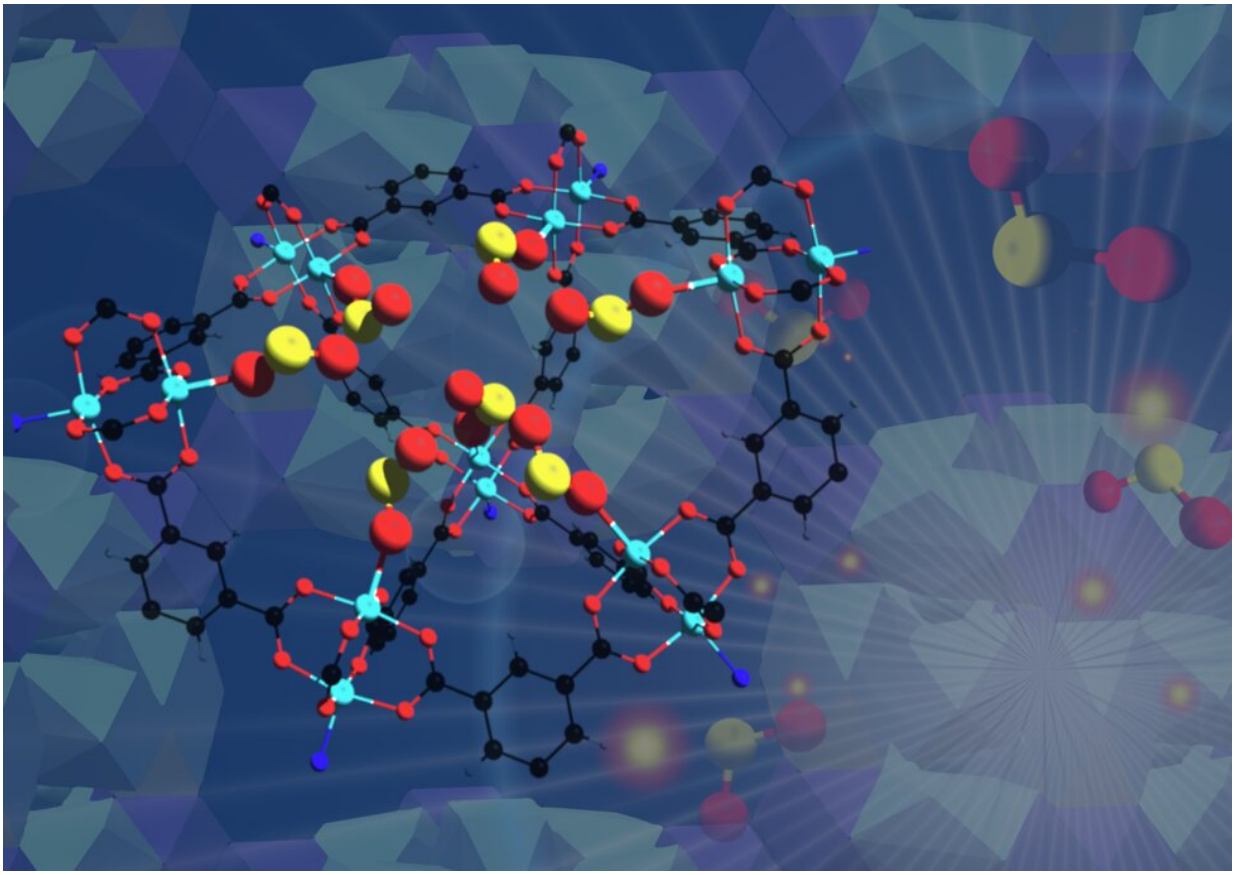

Illustration of sulfur dioxide captured within the MFM-170 material, as revealed by experiments at Berkeley Lab's Advanced Light Source. Credit: Gemma Smith/Manchester University

An international team has developed a robust material that can

selectively take in toxic sulfur dioxide gas at record concentrations and preserve it for use in chemical production. The researchers verified its performance using a combination of techniques that included X-ray experiments at Lawrence Berkeley National Laboratory's (Berkeley Lab's) Advanced Light Source (ALS).

Sulfur dioxide emissions are typically produced by power plants, other industrial facilities, and trains, ships, and heavy equipment, and can be harmful to human health and the environment. The team developed porous, cagelike, stable copper-containing molecules known as metal-organic frameworks or MOFs that are designed to separate sulfur dioxide (SO_2) gas from other gases. The team exposed the MOF material, dubbed MFM-170, to simulated exhaust gases and found that it efficiently separated out SO_2 from the gas mixture at elevated temperatures even in the presence of water.

Existing techniques to remove SO_2 from pollution streams can produce a lot of solid and liquid waste and may only remove 60-95% of the toxic gas, researchers noted, while the MOF has been shown to eliminate SO_2 down to a level below 0.1 parts per million—or 99.99999% SO_2-free. Their study was published Oct. 14 in the journal *Nature Materials*.

More information: Gemma L. Smith et al. Reversible coordinative binding and separation of sulfur dioxide in a robust metal–organic framework with open copper sites, *Nature Materials* (2019). DOI: 10.1038/s41563-019-0495-0

Provided by Lawrence Berkeley National Laboratory

https://phys.org/news/2019-11-metalorganic-framework-toxic-sulfur-dioxide.html