MTU Paper Among 'Most Accessed' in Advanced Materials

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(PhysOrg.com) -- A paper by Michigan Tech faculty member Yun Hang Hu has been ranked among the most accessed articles in the prestigious journal Advanced Materials (impact factor 8.191) for the month of March. The article, "Hydrogen Storage in Metal-Organic Framework," provides an overview of the latest research in this growing field.

Scientists all over the world are trying to develop good ways to store hydrogen for energy, with limited success. “Hydrogen storage is very difficult,” says Hu, an associate professor of materials science and engineering. “You can’t use it in its liquid or solid forms, and as a gas, it’s very light and takes up a lot of space. But if you can find a material that can adsorb it well, it can be stored in a small space.”

Metal-organic frameworks may someday provide that storage space.

These powdered materials are made of organic molecules and a variety of metals, from aluminum to zinc. They have a very high surface area, with lots of nooks and crannies to glom onto hydrogen molecules and hold them in place. Hydrogen gas can be forced into the frameworks by applying pressure and then released by lowering that pressure.

The problem is that most metal-organic frameworks only work at temperatures you might find on the dark side of the moon, about minus 198 degrees Celsius.

In the paper, Hu and his coauthor, PhD student Lei Zhang, reviewed more than 100 publications, organizing and summarizing their findings. They focused on the hydrogen-storage capacity of various metal-organic frameworks, how hydrogen and the frameworks interact with one another, and challenges, including developing a metal-organic framework that works at room temperature.

“Yun and his students are doing pioneering, innovative research in hydrogen storage,” said Mark Plichta, chair of materials science and engineering. “In addition, he has an excellent grasp of the work being done in that area, so it’s no surprise that he would author a review paper that is very useful to other researchers.”

The National Science Foundation funded their work through a $302,650 grant, made available through the American Recovery and Reinvestment Act, also known as federal stimulus money. The grant is also supporting additional research by Hu’s team; Hu and Zhang have recently published two other papers on metal-organic frameworks: “Amorphization of Metal-Organic Framework MOF-5 at Unusually Low Applied Pressure” in Physical Review B and “A Systematic Investigation of Decomposition of Nano Zn4O(C8H4O4)3 Metal-Organic Framework” in the Journal of Physical Chemistry C.

More information: Paper: www3.interscience.wiley.com/cg …/123239164/HTMLSTART

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