

New material could speed development of hydrogen powered vehicles

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Researchers have designed a material made of graphene sheets for hydrogen storage that could advance development of hydrogen powered vehicles. Credit: Oak Ridge National Laboratory

Researchers in Greece report design of a new material that almost meets the U.S. Department of Energy (DOE) 2010 goals for hydrogen storage and could help eliminate a key roadblock to practical hydrogen-powered vehicles. Their study on a way of safely storing hydrogen, an explosive gas, is scheduled for the Oct. 8 issue of *ACS' Nano Letters*.

Georgios K. Dimitrakakis, Emmanuel Tylianakis, and George E. Froudakis note that researchers long have sought ways of using carbon nanotubes (CNTs) to store hydrogen in fuel cell vehicles. CNTs are minute cylinders of carbon about 50,000 times thinner than the width of a human hair. Scientists hope to use CNTs as miniature storage tanks for

hydrogen in the coming generation of fuel cell vehicles.

In the new study, the researchers used computer modeling to design a unique hydrogen-storage structure consisting of parallel graphene sheets — layers of carbon just one atom thick -- stabilized by vertical columns of CNTs. They also added lithium ions to the material's design to enhance its storage capacity.

The scientists' calculations showed that their so-called "pillared graphene" could theoretically store up to 41 grams of hydrogen per liter, almost matching the DOE's target (45 grams of hydrogen per liter) for transportation applications. "Experimentalists are challenged to fabricate this material and validate its storage capacity," the researchers note.

Article: "Pillared Graphene: A New 3-D Network Nanostructure for Enhanced Hydrogen Storage", Nano Letters,
[dx.doi.org/10.1021/nl801417w](https://doi.org/10.1021/nl801417w)

Source: American Chemical Society

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