Helping make hydrogen a staple for consumer vehicles

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Carnegie Mellon University's David S. Sholl is working to identify new materials that would help make hydrogen more stable and cost-efficient than fossil fuels. Increased concern about global warming and a need to conserve natural fuel sources prompted Carnegie Mellon researchers to find new, lightweight, low-cost hydrogen-storage materials.

"We are currently studying the use of metal hydrides, such as alanates and borohydrides, to find materials that could ultimately improve the efficiency of hydrogen cars and curb pollution," said Sholl, a professor of chemical engineering.

Essentially, what Sholl and his research team are trying to do is create a new material that will store larger amounts of hydrogen than can be held in a compressed gas tank, but will still be able to easily release the hydrogen to feed the fuel cell for cars of the future. Hydrogen-powered cars run on fuel cells that combine hydrogen and oxygen from the air to produce electricity. The only waste emitted is water.

By contrast, engines that burn gasoline emit pollutants, such as carbon dioxide, that cause global warming. U.S. vehicles consume 383 million gallons of gasoline a day — or about 140 billion gallons annually. That's about two-thirds of the total national oil consumption, half of which is imported from overseas.

"Hydrogen can potentially be produced from domestic resources without emitting carbon dioxide into the atmosphere, which is an attractive

vision for a future fuel source," said Sholl, whose research is funded by the Department of Energy and performed in collaboration with Professor Karl Johnson from the University of Pittsburgh.

Once hydrogen is produced, transporting and storing it becomes a problem. As a gas, it requires a lot of energy to compress into a volume small enough to fit into a car. Sholl said that his research has used computational methods to screen a large number of possible storage materials, leapfrogging what could have been a decade of work to test the same materials in the lab.

Sholl argues that this research will help streamline hydrogen storage, cut energy costs and ultimately help hydrogen to replace gasoline.

Source: Carnegie Mellon University