Subscribe Day pass The Chronicle's THE CHRONICLE FREE e-mail THE CHRONICLE OF HIGHER EDUCATION news update Leadership Academe The Faculty Forum Today From the issue dated May 8, 2009 June 7-8, 2009 Search The Site A SPECIAL REPORT Washington, D.C. Chemist's Pursuit of Molecular Beauty May Yield Energy Breakthroughs More options Back issues By PAUL BASKEN Join us for a FREE Webinar: Home Omar M. Yaghi's shelves and bookcases are **Redesigning On-Campus** News lined with a colorful assortment of plastic **Computing at Weber State** models, a seeming kaleidoscope of oversized Today's news snowflakes that give his office the whimsical University Current issue Share feel of a toy-design workshop. Thursday, May 21, 2009 11:00 AM Pacific • 2:00 PM Eastern Salary surveys successes Hosted by THE CHRONICLE But the plastic models of molecular structures The Faculty You'll learn: might hold the secret to virtually pollution-free Strategies for designing on-campus computing spaces **Research & Books** automobiles and power-generation plants. **Government & Politics** How to get the most out of your IT budge Mr. Yaghi, a professor of chemistry and Why redesigning your computing env to fit your students' needs increase: productivity and use of your labs Money & Management WEBER STATE biochemistry at the University of California at UNIVERSITY Los Angeles, has spent the past two decades Information Technology pioneering work in a new class of materials Students called metal-organic frameworks. The idea is **Related materials** Athletics to link a metal oxide, a compound that a metal Article: Stimulus Law Revs Up Research on Energy forms with oxygen, to an organic compound, a Register now International molecule containing carbon, to produce a for a special **Community Colleges** Article: New Power Plants Try to Avoid Coal or Scrub It latticelike structure capable of capturing and 'Clean' discount! later releasing other atoms and molecules. Special issues & data 🕀 Article: Colleges Offer New Alternative-Energy Degrees, Short Subjects "Omar has really been the leader in this area," Fueled by Student Demand said Thomas E. Mallouk, a professor of Gazette materials chemistry and physics at Pennsylvania Article: Colleges Drive Research on Electric Cars Corrections State University's main campus. Article tools Potential applications for the discovery are Opinion & Forums V numerous. One that has already been Printer Careers Order developed involves using a metal-organic E-mail Subscribe friendly article framework to store methane, the principal Multimedia component of natural gas, in an automotive fuel tank. The lattice structure can hold the Discuss any Chronicle article in our forums Leadership Forum methane molecules tightly, without the cost of pressurization in a metal tank, and then release Latest Headlines **Technology Forum** them as needed by the vehicle. At the Last Hour, It's Financial Aid **101 for These Students Resource Center** "Our materials work like bees in a honeycomb, Using baseball as a starting point, a nonprofit group in and the bees all swarm onto the honeycomb," Harlem gives last-minute help to high-school students **Campus Viewpoints** uncertain about applying for college admission and Mr. Yaghi said. **Services** financial aid He would like to replicate that technique with Help hydrogen instead of methane. Hydrogen is even A Real-Life Whodunit: Mystery Gifts Spur Media Frenzy more promising as an automotive fuel because Contact us it can be burned without any carbon emissions, Researchers Call for National Strategy for Social About The Chronicle or combined with oxygen in a fuel cell to Networks Subscribe produce only energy and water. President of Struggling Medical University Abruptly Day pass Mr. Yaghi, if successful, would remove one of Resigns Manage your account the leading obstacles to the use of hydrogen in automobiles by finding a storage method that In-State Tuition for Undocumented Students: Not Quite Advertise with us doesn't involve either compression or freezing, **Rights & permissions** neither of which is viable because of factors that include cost and safety. Employment A New Sport Combines the Physical With the Fiscal opportunities Hydrogen is one of the most difficult materials Commentary to store in a useful form, Mr. Mallouk said, and Mr. Yaghi's metal-organic frameworks "are Kevin Carey: College Savings Plans Are a Bad Gamble among the most promising materials for doing that right now."



The Cure for Carbon

Another possible application involves the capture of carbon itself. Carbon in the atmosphere is recognized as the leading cause of human-produced global warming. The United States has enough coal to last more than 200 years, but burning it without safeguards is predicted to accelerate planetary warming, with catastrophic environmental effects.

Mr. Yaghi is seeking a metal-organic framework that could capture carbon as part of the emissions-cleaning system in a coal-fired power plant.

One factor that he recognizes is outside his control, however, is the willingness of others — including companies, governments, voters, and even other researchers — to be more open-minded about possible solutions. "Scientific challenges exist, and they are incredible," Mr. Yaghi said. But it's usually the business and political elements that impede progress.

Such obstacles have taken the form of fellow scientists who did not initially appreciate the potential of the metal-organic frameworks, he said, and were not inclined to support his grant requests while serving on review boards.

With time, that has changed. The Jordanian-born Mr. Yaghi is now listed among the top 10 most highly cited chemists worldwide by the Essential Science Indicators database of Thomson Reuters, covering the past decade.

Even if his anticipated breakthroughs materialize, it's not clear how widely they will affect the world of alternative and renewable energy. Coal plants pose pollution threats beyond their carbon emissions, and hydrogen faces other major scientific and logistical obstacles to its use as an automotive fuel.

As much as he would like to be part of the energy solution, Mr. Yaghi said, his work centers on appreciating the natural beauty of materials on the molecular level, and he is confident that appreciation will keep producing important discoveries.

"I had not set out to make a useful material," he said. "I simply wanted to address a scientific challenge."

http://chronicle.com Section: The Faculty Volume 55, Issue 35, Page A10

<u>Copyright</u> © 2009 by <u>The Chronicle of Higher Education | Contact us</u> <u>User agreement | Privacy policy | About The Chronicle | Site map | Help</u> <u>Subscribe | Advertise with us | Press inquiries | RSS | Today's most e-mailed</u> Home | Chronicle Careers | The Chronicle Review