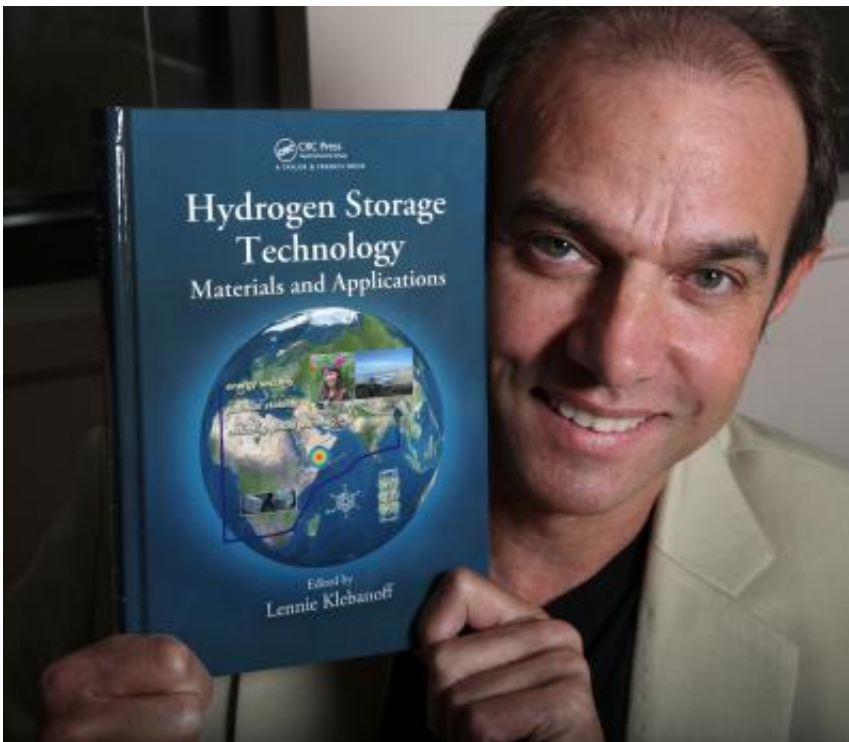


# New book highlights pressing need for hydrogen-powered vehicles

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Sandia National Laboratories' Lennie Klebanoff says he feels a personal responsibility to inform technical readers and the public about the urgent need to get zero-emission hydrogen technology into the nation's vehicles and other carbon-producing applications. Credit: Dino Vournas, Sandia National Laboratories

Sandia National Laboratories reveals the breadth of its hydrogen fuel expertise in the recently published *Hydrogen Storage Technology* –

Materials and Applications.

Sandia researcher Lennie Klebanoff is confident that the book's content will give readers a sense of urgency about the need to get zero-emission [hydrogen fuel cell vehicles](#) on the road, and to get other hydrogen-based power equipment into the marketplace.

Klebanoff, who serves as the book's editor and co-wrote half the chapters, knows his topic well. He was director of the Metal Hydride Center of Excellence (MHCoE), one of three U.S. Department of Energy (DOE) Hydrogen Storage Centers of Excellence dedicated to solving the problem of storing hydrogen on automobiles. This Center, competitively selected and funded through DOE's Office of Energy Efficiency and Renewable Energy (EERE), included 21 partners from industry, academia, and national laboratories from 2005 through 2010.

In addition to Klebanoff's own background, he drew upon the considerable hydrogen expertise at Sandia/California to complete the book. Sandia's Daniel Dedrick, Terry Johnson and Vitalie Stavila each contributed to various chapters, and now-retired Sandia hydrogen program manager Jay Keller co-wrote a pair of chapters as well. "It was a real team effort and clearly shows the level and breadth of hydrogen knowledge here at Sandia," Klebanoff said.

In addition to the Sandia authors, 21 others contributed, including authors from Lawrence Livermore National Laboratory and from other countries including Canada, China, and the United Kingdom. "I felt strongly it was important to have an international perspective, as our energy issues are global and interconnected," said Klebanoff.

**Climate change, other factors drive need for hydrogen use**

In addition to his work with the MHCoe, Klebanoff also led a successful effort to develop a fuel cell mobile lighting system, so it didn't come as a shock when publisher Taylor & Francis asked if he'd edit this book on hydrogen storage.

He agreed, realizing that work in the MHCoe and the other two Hydrogen Storage Centers of Excellence had resulted in a great deal of technical data that was ready to be compiled and shared with researchers. In addition, Klebanoff said he feels a personal sense of responsibility to inform technical readers and the public about the urgent need to get zero-emission hydrogen technology into the nation's vehicles and other carbon-producing applications.

"Not only does this book go into significant technical details, it can also help consumers, political leaders and even some scientists get a better understanding of how bad the global climate change problem really is, and that it has been with us for a century," Klebanoff said. The book also discusses fuel resource insecurity and political energy insecurity as viable reasons for the nation to convert to hydrogen-based vehicle and power technology. Klebanoff defines political energy insecurity as the political difficulties that can emerge when the energy resources that one country needs depend on another country.

Hydrogen Storage Technology addresses such technical issues as the chemistry of hydrogen storage materials, codes and standards, pressure vessels and engineered hydrogen storage systems. A chapter led by Johnson reviews a recent General Motors/Sandia project that developed the first engineered hydrogen storage bed that could satisfy the fuel demands of real automotive drive cycles.

## **Storage not a barrier for fuel cell vehicle commercialization**

Klebanoff himself said storage isn't the technical hurdle some believe it to be.

"We actually make the argument that storage is not a huge barrier," he said. "All of the major car manufacturers have produced hydrogen vehicles, and they can all run for at least 240 miles, and in one case, even up to 430 miles."

He acknowledged that the research community must work harder to meet the government and industry consumer vehicle target of at least 300 miles across a range of vehicle types and sizes.

"However, there is no technical hydrogen storage barrier preventing the roll-out of the first hydrogen-powered vehicles today," Klebanoff asserted.

Independent reviewers of the book have been enthusiastic. Professor Klaus Yvon from the University of Geneva, an international leader in the hydrogen storage community, has called it "a breath of fresh air in the field of hydrogen storage research. This book is unique in that it combines materials science, physics and engineering aspects on various [hydrogen storage](#) methods into a single volume, while not forgetting application issues." Yvon added that "it should be treated as compulsory reading for students and researchers in the field."

Provided by Sandia National Laboratories

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