

# Researchers discover new class of compounds with novel chemistry

January 19 2007

---

Researchers have discovered a new class of aluminum-hydrogen complexes that exhibits unique chemistry and may one day be used as basic building blocks to create materials for use in alternative forms of energy and high energetic materials.

The results of the research, headed jointly by Puru Jena, Ph.D., distinguished professor of physics, and Boggavarapu Kiran, Ph.D., assistant professor of physics, both at Virginia Commonwealth University, and Kit H. Bowen, Ph.D., professor of chemistry at Johns Hopkins University, is reported in today's issue of the journal *Science*.

Through combined theoretical and experimental study, Jena, Kiran, Bowen and colleagues have identified a new class of aluminum and hydrogen molecules (Al-H) that are very stable and can potentially be created in bulk quantities.

The new Al-H molecules are similar in structure and composition to boranes, which are composed of boron and hydrogen atoms. This article focuses on one species, namely Al<sub>4</sub>H<sub>6</sub>. While boranes are known to form a wide array of structures, very little information was known about similar Al-H systems.

The researchers believe that these newly discovered compounds may have applications in hydrogen storage as well as high energetic materials in the future. Scientists can potentially apply this discovery to the design and synthesis of new materials with a chemistry that can be altered at the

nano-scale one atom at a time.

"We believe our findings will open a new chapter in Al-H chemistry and may have important applications in materials science," said Jena.

"Developing new materials and compounds that meet some of the current technological problems in energy-related fields is always a challenge. Our collaborative work has demonstrated that a synergy between experiment and theory can go a long way in meeting these challenges, particularly in developing novel nano-materials for storing and releasing hydrogen as well as for high-energetic materials applications."

"In addition, opening a new chapter in Al-H chemistry provides a means for discovering many novel nano-scale systems hitherto unknown," Kiran added.

"It's always tough to predict how things will play out in the future, but our research finding is interesting enough for me to be willing to say that this discovery may have the potential for some possibly very useful and interesting future applications, including some in the forecasted 'hydrogen economy,'" Bowen said.

The theoretical investigations for this project were conducted by Jena along with B. Kiran, Ph.D., and M. Willis, a graduate student in the physics department at Virginia Commonwealth University. The experimental work was conducted by Bowen with X. Li, A. Grubisic, S.T. Stokes, and J. Cordes, all research scientists in the chemistry department at Johns Hopkins University; and G.F. Ganteför, a professor at the University of Konstanz visiting Bowen's lab at Johns Hopkins University. In addition, R. Burgert and H. Schnöckel, researchers with the Institute of Inorganic Chemistry at the University of Karlsruhe in Germany contributed to this research.

Source: Virginia Commonwealth University

Citation: Researchers discover new class of compounds with novel chemistry (2007, January 19)  
retrieved 24 April 2024 from <https://phys.org/news/2007-01-class-compounds-chemistry.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.