

## Japanese Researchers Directly Observe Hydrogen Atom

Nov 5, 2010 15:19

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Japanese researchers announced that they have succeeded in directly observing a hydrogen (H) atom for the first time in the world.

H atom has an atomic number of 1 and, with a diameter of about 0.1nm, it is the smallest atom of all the elements. The achievement is expected to accelerate the research and development of technologies to store hydrogen, silicon devices and so forth.

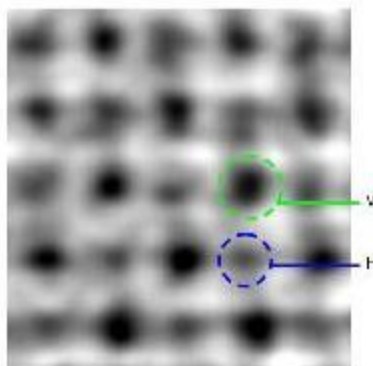
The research results were published Nov 5, 2010, on the online edition of the English magazine "Applied Physics Express (APEX)" published by the Japan Society of Applied Physics (JSAP).

The results were achieved by a research group led by Yuichi Ikuhara and Naoya Shibata, professor and assistant professor, respectively, at the Institute of Engineering Innovation, School of Engineering, the University of Tokyo, in collaboration with Tomohiro Saito, researcher at the Japan Fine Ceramics Center (JFCC), and Jyunko Matsuda, researcher at Japan's National Institute of Advanced Industrial Science and Technology (AIST).

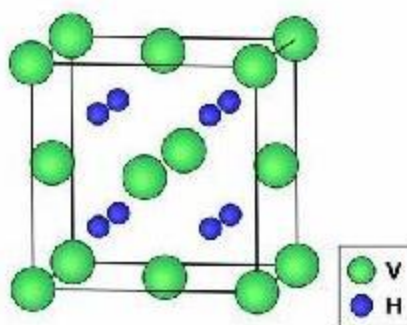
They observed a vanadium hydride ( $\text{VH}_2$ ) crystal, which is a hydrogen absorbing metal, by using a newly-developed high-resolution electron microscope.

The microscope was developed by making improvements to the ARABF-STEM high-performance electron microscope, which was developed by the research group and JEOL Ltd in 2009. Specifically, the lens of the ARABF-STEM was corrected for spherical aberration, and the resolution of 0.1nm (1 angstrom) or less was realized by theoretically calculating the optimal angle for observation.

In May 2010, the University of Tokyo, JFCC and Toyota Motor Corp observed a lithium cobalt oxide ( $\text{LiCoO}_2$ ) crystal, which is a positive electrode material of lithium-ion (Li-ion) rechargeable battery, by using the same method and succeeded in taking pictures of Li ions, oxygen ions and cobalt ions in the crystal. The atomic number of lithium is 3, which is smaller than that of helium (2).



An image of vanadium hydride crystal



The structure of vanadium hydride crystal

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