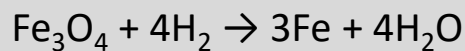


Hydrogen generator using nano-sized iron particles for fuel cells

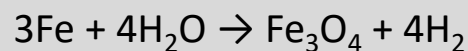
Hydrogen fuel cells are one of the most promising energy conversion devices that can solve recent environmental issues. However, how to store and transport hydrogen securely as fuel, is still a major problematic subject. UCHIYA proposes a simple and safe 2-step method for the storage and production of hydrogen utilizing oxidation and reduction of nano-sized iron particles:

Step1

Chemical storage of hydrogen (Reduction of iron oxide)


Step2

Production of hydrogen (Re-oxidation of iron)



Magnetite (Fe_3O_4) is reduced to metal iron with hydrogen in Step1. Hydrogen is subsequently generated by reacting water with metal iron in Step2. Therefore, Step 1 corresponds to the chemical storage of hydrogen utilizing iron as a medium, and in Step 2, hydrogen can be theoretically generated up to 4.8 wt% relative to iron.

Based on this principle, we developed a fuel cell scooter that can run on iron and water, and conducted verification tests.


 Pelletized Fe/Fe₃O₄ nanoparticles

 Cartridges filled with Fe/Fe₃O₄ pellets


Fuel cell scooter

Presented paper

Dr. Kazuyuki Iizuka¹, Mr. Kiyozumi Nakamura¹, Dr. Kiyoshi Otsuka²,
 Chemical storage of hydrogen by utilizing iron nano-particles, Proceedings of Renewable Energy 2006
 International Conference and Exhibition, Makuhari Messe, Chiba, Japan (2006) P-H-20, 1352-1355.

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