Hydrogen and Electric Energy Production and Storage

based on Aluminum-Water Reaction

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In recent years much effort has been made in order to meet the growing energy consumption around the world, and to find resources for clean energy. One of the main solutions is using hydrogen as a source for electric energy via fuel cells. Hydrogen is an ideal fuel due to its high reaction energy, up to three times more than fossil fuels, and its environmental friendly reaction products, only water. Fuel cells use hydrogen to produce electric energy in high efficiency and without pollution. Hydrogen is not widely used today due to difficulties in storage and transportation, caused by its low density, and safety issues due to its high reactivity.

This lecture will present a novel technology for safe and compact hydrogen generation on-demand based on the aluminum-water reaction. A patent for aluminum activation was developed at the Fine Rocket Propulsion Center at the Faculty of Aerospace Engineering, enabling spontaneous and sustained reaction between aluminum powder and any type of water (e.g., tap water, sea water, and grey water) at room temperature.

The presented technology is characterized by high specific electric energy storage, substantially exceeding that of batteries. It can be used for various applications including: emergency generators, energy for soldiers, electric energy in commercial aircraft, trucks, cars, and autonomous vehicles.