Hydrogen

Fossil and nuclear fuel reserves are becoming increasingly limited, and the world's energy future will have to include several renewable alternatives to these failing resources .

Hydrogen, the most abundant element in the universe, is one of the cleanest fuels because when it burns, the result is simple water and unlike petroleum, it can be easily generated from renewable energy sources. That is why there are efforts to create engines that can power automobiles on hydrogen. This would greatly help to reduce the air pollution and global warming problems .

One problem with using hydrogen to directly power an automobile is that it is very expensive to create pure hydrogen for this use. Beside it is so difficult to store that its use as a fuel has been limited. A gram of hydrogen gas occupies about 11 liters (2.9 gallons) of space at atmospheric pressure, so for convenience the gas must be intensely pressurized to several hundred atmospheres and stored in a pressure vessel. In liquid form, hydrogen can only be stored under cryogenic temperatures (20k). These options are not practical for everyday use.

The solution to these difficulties is storage of hydrogen in hydride form. This method uses an alloy that can absorb and hold large amounts of hydrogen by bonding with hydrogen and forming hydrides. A hydrogen storage alloy is capable of absorbing and releasing hydrogen without compromising its own structure. Storage of hydrogen in solid materials has the potential to become a safe and efficient way to store energy, both for stationary and mobile applications. There are four main groups of suitable materials: carbon and other high surface area materials; H_2O-reactive chemical hydrides; thermal chemical hydrides; and rechargeable hydrides.

This workshop is held to identify potentially new and promising hydrogen storage materials such as metal hydrates. During the workshop, The participants will also familiar with nanostructure materials for hydrogen energy storage and their applications .