HYDROGEN is produced from fossil fuels by steam reforming, a process that not only involves exhaustible energy resources but also leads to the emission of a large amount of carbon dioxide that promotes global warming. So, in view of pressing energy and environmental issues, it is important to produce hydrogen from natural resources.

Scientists from the CSIR-National Chemical Laboratory (CSIR-NCL) have developed an artificial leaf that absorbs sunlight to generate hydrogen fuel from water. This is an advanced technology that provides clean energy for powering eco-friendly cars and other machines in the future. The ultra-thin wireless device mimics plant leaves to produce energy using water and sunlight. The device consists of semiconductors stacked in a manner to simulate the natural leaf system. It has an area of 23 square centimetres. When visible light strikes semiconductors, electrons move in one direction and produce electric current. The current almost instantaneously splits water into hydrogen – making it one of the cleanest forms of fuel as its main by-product is water. It can produce 6 litres of hydrogen fuel per hour.

To improve light-absorbing efficiency of artificial leaf, researchers used gold nanoparticles, titanium dioxide and quantum dots. Quantum dots are semiconductor crystals of nanometer dimensions with properties that depend on the size of dots. When exposed to sunlight for 25 hours, the device retained its efficiency. The cell does not need any external voltage and performs better than existing solar cells.

The research has been published in an online open access journal Scientific Reports.

(Source: www.csir.res.in)