

SPLITTING WATER MOLECULES VIA CONDUCTIVE NANOMATERIALS FOR HYDROGEN PRODUCTION

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One of the main topics of discussion at every multi-national forum is about the fossil fuel depletion and carbon footprints. It is believed that the world will run out of cheap oil in 30 years, causing energy costs to rise, and probably hitting the economies of many nations. Time is now to look for alternative sources of energy, so that a gentle transition from fossil fuels to renewable sources can take place. While several research programs are being conducted mostly on the sun and wind energies, there is one more source that covers 71% of the Earth surface, which is water and unique to the Earth. Splitting water using electrolysis forms oxygen and hydrogen molecules. Hydrogen has several uses in energy generations, including fuel cells, hydrogen-powered engines, heating, and many others. In this experiment, conductive nanoparticles, such as graphene, carbon nanotubes, C60, and indium tin oxide, were added into pure water with 10% of sulfuric acid solution, dispersed very well, and then electric current is passed through the dispersion at different DC voltages. During the tests, hydrogen gas was formed at the cathode, the negative side of the cell. The industrial hydrogen production using acid and pressure is very costly, and cannot compete with the fossil fuels. However, adding the nanoparticles increased the yield of hydrogen at lower voltages up to 10 fold. If the overall process is successful at a larger scale, the hydrogen production will be considerably low for the future energy demand of the world.