

Solar Energy Harvesting Using Ionic Polymer- Metal Enhanced Water Electrolysis

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In 2015, Kansas invested six million dollars on 4.7 megawatts of solar energy installation, capable of powering 630 homes. However, the energy supplied by solar often does not coincide with consumer demand; a system is required that can store the extra energy in the form of other deliverable and storable energy sources for later use. Hydrogen has high energy density and burns with zero carbon oxide emission, which makes it an ideal energy source to be stored and consumed. The goal of this project is to develop a highly energy-efficient water electrolysis generator, which can convert the electricity harvested from solar panels to hydrogen fuel. Previous research has shown that applying electricity to Ionic Polymer-Metal Composite (IPMC), a proton exchange membrane (PEM) plated with platinum electrodes, can split water molecules with high energy-conversion efficiency. Our research explores a new IPMC fabrication method that can further improve the efficiency. Our experimental data show that roughening the surface through sanding or plasma etching of IPMC with an extra coating of gold can improve the efficiency. The data also validate a dynamic model that is developed to capture the dynamics of IPMC enhanced water electrolysis.