Automated Hydrogen Generator for Perspective Fuel Cell

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The presented hydrogen generator is efficient in combination with a hydrogen fuel cell. Imagine an electric car that runs on electric power accumulated in its battery. Battery charged at a local charging point, sourced by the power plants. Also, consider other electric cars consuming hydrogen for electric fuel cells and take into account that this hydrogen is obtained simultaneously in the same car, i.e. is not obtained by electrolysis in a stationary device connected to the power grid. Our project differs from other analogues because in this project hydrogen fuel cells and hydrogen generators are aggregated in one device. Also, in the fuel cell of our design instead of the expensive platinum catalyst is used much cheaper nickel electrodes covered with carbon nanofibers. The carbon nanofibers embedding technology in a nickel electrode surface were developed by us. In the offered design hydrogen gas is produced upon contact an aluminum alloy scrap with caustic sodium solution resolved in water. In the presented devise, a microcontroller using signals from pressure, temperature and humidity sensors, regulates the reaction process. For safety, we have created an emergency system that,in case of a sudden increase in pressure, will immediately remove aluminum foil from the aqueous NaOH solution, therefore the reaction will stop. The heat released during the reaction is utilized by Peltier thermoelectric generators, which are installed on the outer surface of the cylindrical vessel, have radiators and, together with the power receiving unit, constitute the reactor cooling system. Thermoelectric generators give us 5 volts with a temperature difference of 60 degrees between the hot and cold sides. The received power is used for the autonomous operation of the control mechanism.

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