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Licensing Opportunity

TTO – Technology Transfer Office

Advanced alkaline electrolyzer incorporating electrocatalysts for water splitting

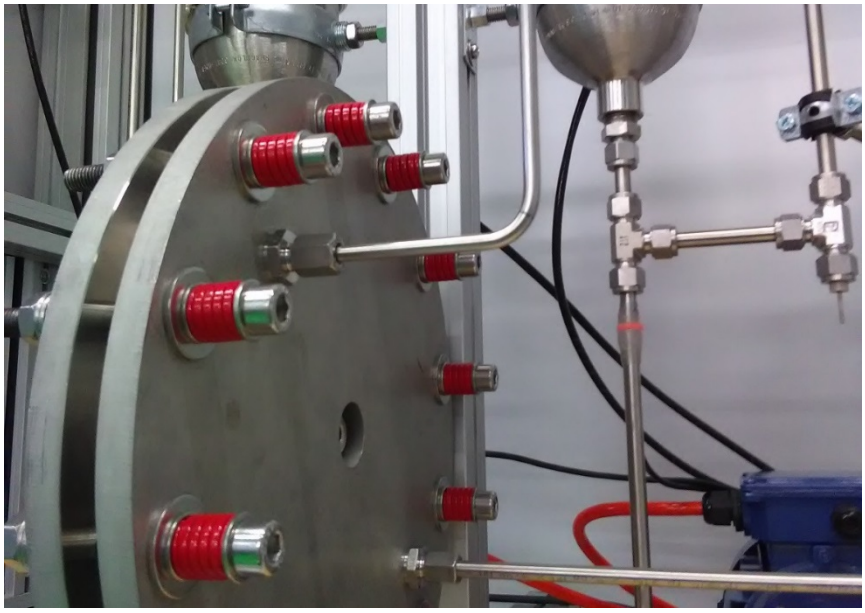

Image of the prototype advanced alkaline electrolyzer developed at the LSCI

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6.1671

Keywords

Alkaline electrolysis
Electrocatalysts
Water splitting
Hydrogen
Energy storage

Intellectual Property

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Description

Alkaline water electrolysis systems are used for industrial production of high purity hydrogen. The traditional electrolyzer employs two nickel electrodes separated by a porous diaphragm immersed in a flowing, concentrated (30 wt%) KOH solution. The technology is robust and large (MW scale) installations have lasted for more than 50 years in operation. The main drawback of the traditional technology is the lower efficiencies when compared to emerging PEM technology. We demonstrate that advanced electrolyzers can have higher efficiencies (for example, twice higher as compared with similar operating conditions) by incorporating novel electrocatalysts in an innovative stack configuration.

Advantages

Our advanced alkaline electrolyzers maintain the robustness and long lifetimes. The low cost electrocatalysts used in both cathode and anode reduce the energy losses in the production of hydrogen and oxygen, increasing the overall efficiency of the system.
The permeable electrodes are assembled in a thinner cell, separated only by a thin porous diaphragm that keep oxygen and hydrogen separated. Due to this small distance, the ohmic losses of the cell are reduced. In addition, the whole system can run under a pressure of 40 bar, decreasing the energy needs for compression.

Applications

Small scale applications (5 to 15 kW) for house installations. The electrolyser can store solar energy in the form of hydrogen that can later be used to power a fuel cell system
Medium size installations (15 to 200 kW) for feeding hydrogen refilling stations and hydrogen cars. In large systems heat can be easily recovered maximizing the overall efficiency.