ENERGY EFFICIENT METHOD FOR GENERATING HYDROGEN THROUGH SULPHUR DIOXIDE ELECTROLYSIS

Electrolysis cell comprising sulphur dioxide-depolarized anode and method of using the same in hydrogen generation.

Technology Overview

This technology involves a method for generating hydrogen in an electrolysis cell. A proton exchange membrane (PEM) is used to separate anode and cathode chambers of the cell. The space between the anode and the PEM is filled with an aqueous sulfuric acid. In use, gaseous sulphur dioxide is fed to the side of the anode facing away from the sulfuric acid solution, and a current is supplied to the electrolysis cell. Consequently, sulphur dioxide is oxidized at the anode, and molecular hydrogen is generated at the cathode. On this case sulphur dioxide-depolarized electrolysis (SDE) principle is used.

Technology Benefits

- Large-scale production of hydrogen.
- Coupling hydrogen production with the heat generated by nuclear reactors.
- Use of thermal energy from a nuclear reaction to store energy in the form of molecular hydrogen.
- Sulphur dioxide-depolarized electrolyzer (SDE) has the potential to reduce the amount of electrical power required for hydrogen production.

Market Opportunity

The Hybrid Sulphur (HyS) cycle was developed by the Westinghouse Electricity Corporation in the US and has also been extensively studied. The chemistry of the cycle is relatively simple with two basic reactions, one of which is an electrolysis step in which sulphur dioxide (SO_2) is oxidized at one electrode to produce sulfuric acid while protons are reduced to form hydrogen. Given the large scale of nuclear power plants, excess heat can be used also at a large scale to generate hydrogen also at a large scale.

Project status

South African patent granted - 2010/00807

Looking for a technology development partner or licensee.

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