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Sekian, Wassalam.

Prof. Ir.Dr.Hj Wan Ramli Wan Daud

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MEMBRANE REACTOR FOR HYDROGEN MODELING

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Abstract

Estimated peak for the word energy production will occur between 2005 and 2015 (source, International Energy Agency (IEA) and United Stated Geological Survey (USGS)), seek alternative energy source are become important research. Fuel cell are quickly growing in popularity because they are use hydrogen as fuel and hydrogen is renewable. This research provides the designing, and optimizing membrane reactor in producing hydrogen that is suitable to fulfil the fuel specifications of the PEM-Fuel Cell Unit. Membrane reactor offers the possibility of overcoming the thermodynamic limitation of the reversible chemical reaction. If one of the reaction products removed from the reaction system, equilibrium-limited reaction's can achieve higher conversions at lower temperature. In this conditions combined of reaction and separation together at the same side can be considered as a means to improve energy used efficiency. The appropriate reactor design managed to improve yield or reaction selectivity, and reduce downstream separation costs. The operating temperature for reforming is 150^{o}C to 280^{o} has been designed for optimum condition, corresponding with the experimental result. Pd-Ag membrane is suitable for hydrogen purification which can be applied to fuel-cell system but the cost is high. Combined organic and inorganic membrane designs can reduce cost and time needed for fabricating gas separation membrane, improving and facilitating yield and selectivity.

Keywords: Membrane reacktor modelling, hydrogen production

REVIEW: MODELLING OF WATER AND THERMAL MANAGEMENT FOR PEM FUEL CELL SYSTEM

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Abstract

This paper presents a models literature overview with emphasizing on water and thermal management of proton exchange membrane fuel cell (PEMFC) system. The models are classified into two big classes based on boundary of the system itself. The first class is concerning on mass and heat transfer in PEMFC components, involve membrane electrode assembly (MEA), single cell, and stack. The second class is concerning on mass and heat transfer in integrated system, i.e. PEM stack and auxiliary equipments (compressor, humidifier, cooler, etc.). The challenge of the model development in the future is also discussed.

Keywords: Model, water management, thermal management, PEMFC components, integrated system

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