Pengaruh kompaksi dan sitering terhadap cell komposit matrik polimer hasil metalurgi serbuk

Agus Pramono, author

Abstrak

Saat ini telah dikembangkan suatu metode komposit yang dikenal dengan PMC (Polime memenuhi criteria untuk bahan fuel cell baik dari mechanical properties maupun electrical properties. Karakteristik Carbon Graphite yang keras dan kuat. dan Resin Phenolic yang ringan dan ulet merupakan properties yang memenuhi untuk produk membran komposit yang berupa graphite bipolar plate maka kedua material tersebut sangat tepat jika digabungkan menjadi komposit yang baru yaitu komposit matrik polimer (PMC) melalui proses

Powder Metalurgi (P/M) Membran polimer merupakan komponen yang sangat penting dalam PEMFC mengingat peran komponen ini dalam memisahkan reaktan dan menjadi sarana transportasi ion hydrogen (proton)(4) yang dihasilkan oleh reaksi anoda menuju katoda sehingga reaksi katoda yang menghasilkan energi listrik dapat terjadi. Sehingga dibutuhkan bahan membrane yang memenuhi properties yang dibutuhkan untuk Fuel Cell.

Graphite bipolar plate sebagai membrane fuel cell dipengaruhi oleh mekanisme proses pembuatanya dan variable dari proses tersebut. Proses pemanasan sintering dan Proses kompaksi merupakan variable mutlak dalam mekanisme proses powder metalurgi. Disamping itu juga fraksi volume dari komposisi bahan yang dipadukan.

Penelitian ini menekankan pada pengaruh Sintering dan kompaksi pada karakteristik graphite bipolar plateFuel Cell hasil proses Metalurgi Serbuk. Material yang digunakan adalah serbuk Resin Phenolic sebagai matriksnya dan serbuk grafit sebagai reinforcenya. Dalam penelitian ini untuk metode pembuatan PMC dengan proses Metalurgi Serbuk menggunakan variable proses temperature sintering 100:200dan 300 °C dan penekanan kompaksi 100:200 dan 300 bar serta fraksi volume 50:50% 60:40% dan 70:30%.

Penelitian ini bertujuan untuk mengamati pengaruh temperatur sintering dan kompaksi terhadap karakterisasi dari komposit graphite bipolar plate yang meliputi pengujian kekerasan, kuat tekan, densitas, porositas,konduktifitas listrik, mikroskop optik dan SEM/EDS pada PMC Graphite bipolar plate dengan proses Metalurgi Serbuk.

Dari hasil penelitian ini diperoleh bahwa dengan pemanasan temperatur sintering mendekati Tg (200 ºC) dari Matriks polimer maka akan meningkatkan mechanical properties dari komposit matrik Polimer. Dan pada penekanan maksimum akan meningkatkan electrical properties yang merupakan spesifikasi karakter dari graphite bipolar plate.
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Recently it has developed by a new material that was known as PMC (Polymer Matrix Composite) for bipolar plate fuel cell which produced by compaction of two powders i.e. phenolic resin and graphite with carbon black. The process used is powder metallurgy. The characterization of the material including mechanics & physical properties has investigated. Characteristically carbon graphite that hard and strong and Phenolic Resin that light and tenacious was properties that met for the membrane product composite that take the form of graphite bipolar plate then second material this was very exact if being united to composite that just that is composite matrix the polymer (PMC) through the process Powder Metallurgy (P/M).

The polymer Membrane was the component that very important in PEMFC and DMFC remembered the role of this component in separating the reactant and becoming transport means of the ion hydrogen (the proton) that was produced by the reaction of the anode towards the cathode so as the reaction of the cathode that produced electricity energy could happen. So as to be needed the material membrane that met properties that was needed for Fuel Cell.

Graphite bipolar plate as membrane fuel cell was influenced by the mechanism of the process him and variable from this process. The process compaction and the heating sintering was variable absolute in the mechanism of the process powder metallurgy. Nearby same the volume faction from the material composition that was combined.

This research stressed the Sintering influence and compaction in the characteristics graphite bipolar plate. Fuel Cell results of the process of Dust Metallurgy. Materials that was used was Phenolic Resin dust as his matrix and graphite dust as reinforce him. In this research for the PMC production method with the process of Dust Metallurgy used variable the process temperature sintering 100:200dan 300 and the emphasis compaction 100:200 and 300 bar as well as the volume fraction 50:50% 60:40% and 70:30%

This research aimed at observing the influence of the temperature sintering and compaction towards the haracterization from composite graphite bipolar plate that covered the testing of the violence, strong pressed, the density, the porosity, conductivity electricity, the optic microscope and SEM/EDAX to PMC Graphite bipolar plate with the process of Dust Metallurgy.

From results of this research was received that with the heating of the temperature sintering approached tg (200 ºC) from the polymer Matrix then will increase mechanical properties from composite matrix the Polymer. And in the maximum emphasis will increase electrical property that was the specification of the character from graphite bipolar plate.