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PEAP1_AMD_1

Tungsten Oxide Gas Sensor by Sol-Gel for Detection of Ethanol At Low Temperature

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In this work, tungsten oxide WO_3 powder with average grain size of 50 nm was prepared using modified Nishide-Mizukami sol–gel method. The powder was characterized using XRD and SEM coupled with TEM. The ethanol vapor sensing properties were investigated at different operating temperatures and gas concentrations. The WO_3 pellet ethanol sensor exhibits excellent sensitivity to ethanol vapor with maximum sensitivity value of 29 at low temperature which is 200 °C. It was shown that the WO_3 pellet can be reliably used to monitor the high concentration of vapor above 1500 ppm. This study demonstrates the possibility of utilizing WO3 pellet as a sensor element for the detection of ethanol vapour.

PEAP1_AMD_2

Trend in Research of Composites Based on Oil Palm Fiber, the Current and Future Applications – a Review

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This review deals with oil palm fiber as fillers in composites. Fiber reinforced plastics are used when there is a need obtain high mechanical properties from low weight material. Natural fibers are used because they are renewable, low cost, low density and have the functional capability to substitute some of the widely used synthetic fibers. Oil palm fiber are by-product or waste from oil palm industry and Malaysia as one of the top producer of oil palm must utilize this waste. Most research for oil palm fibers are currently using synthetic polymer as a matrix. Bio-polymers which are made from 100% renewable resources are a better choice as these polymers are biodegradable and thus are capable of decreasing the rising environmental problems caused by synthetic polymers. Composites based on oil palm fiber are finding applications in many fields ranging from construction industry to automotive industry.

PEAP1_AMD_3

Comparison of Predictive Models for Relative Permeability of CO_2 in Matrimid-Carbon Molecular Sieve Mixed Matrix Membrane

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Different well-known gas permeation theoretical models such as Maxwell model, Bruggeman model, Lewis-Nielson model, Pal model, Felske model and modified Felske model has been discussed for prediction of the relative permeability of CO_2 in Matrimid® 5218-Carbon Molecular Sieve (CMS) mixed matrix membranes (MMMs). For evaluation of the theoretical models, experimental data of relative permeability for CO_2 in Matrimid® 5218-Carbon Molecular Sieve (CMS) mixed matrix membrane were compared with the prediction of the theoretical models for the relative permeability of CO_2 in ideal and rigidified interfacial morphology of the mixed matrix membrane. Comparison of those models was carried out based on the widely used model validation criteria including absolute average relative error percent and standard deviation. For the models evaluated under ideal morphology, the results showed a decrease in the absolute average relative error percent and standard deviation in the following order: Pal model > Lewis-Nielsen model > Maxwell model > Bruggeman model. For other models evaluated considering the presence of rigidified interfacial morphology, the absolute average relative error percent and standard deviation showed a decrease in the order, Felske model > modified Felske model. Hence, the modified Felske model was found to be in a better agreement with experimental data for prediction of relative permeability CO_2 in Matrimid® 5218-CMS mixed matrix membrane.

PEAP1_AMD_4

Microporous Silica Membranes for Separation of Hydrogen From Mixture of Gases

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This paper presents the microporous silica membranes for gas separation, particularly for the separation of hydrogen from process streams. The properties, preparation and performance of microporous silica membranes were presented and discussed. It includes an overview of recent literature and advancement in microporous silica membranes, and hurdles for hydrogen separation from mixture of gases. Microporous silica membranes are normally prepared by sol–gel or hydrothermal methods, and have high stability and durability in high temperature, and harsh impurity environments. In this article, we have also reviewed the microporous silica membranes derived both from sol-gel and CVD methods, and compared their performance in hydrogen separation from mixture of gases at an elevated temperature in presence of steam or vapours.

PEAP1_AMD_5

The Development of an Optimum Material Selection Process for the Design of Automotive Brake Rotor

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An automotive brake rotor is a device for slowing or stopping the motion of a wheel while it runs at a certain speed. The widely used brake rotor material is cast iron which consumes much fuel due to its high specific gravity. In this paper a systematic material selection process using cost per unit strength and digital logic methods were developed to substitute this cast iron by any other lightweight material. Material performance requirements were analyzed and alternative solutions were evaluated among cast iron, aluminium alloy, titanium alloy, ceramics and composites. Mechanical properties including compressive strength, friction coefficient, wear resistance, thermal conductivity and specific gravity as well as cost, were

used as the key parameters in the material selection stages. The analysis led to aluminium metal matrix composite as the most appropriate material for brake rotor system.

PEAP1_GTR_1

Sintering Effect on Short-Carbon Fiber-Reinforced Copper Matrix Composites

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Copper has excellent thermal and electrical properties but low mechanical and wear properties limited its use in various industries. In this study, Short-fiber-reinforced copper matrix composites (SCFCMC) were fabricated to enhance the mechanical and wear properties. SCFCMC were fabricated via powder metallurgy technique. A number of formulations including ranges of fiber volume content were compacted at ambient temperature and sintered in Argon. Green density and sintered density of test samples were compared. A 95% sintered density was achieved in this experimental work. Defects such as porosity and cracks were also noted on the surface of the sintered test samples. The microstructure of the sintered samples showed improved inter-particle diffusion and wetting of carbon fibers.

PEAP1_GTR_2

Fast Pyrolysis of Kernel Shell in the Presence of Silica Catalyst Using Py/GC-MS Technique

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In this study, fast pyrolysis of kernel shell biomass at 600 °C was simulated analytically using Py/GC-MS technique. The complicated mixture of highly oxygenated compounds presented in the pyrolysis vapors of kernel shell was grouped as acids, aldehydes, phenols, esters, alcohols and ketones. Silica was investigated for its potential as online, vapor phase, upgrading catalyst for the kernel shell pyrolysis products. The effect of silica specific surface area on the yield of different functional group was established.

PEAP1_GTR_3

Simulation of Hydrogen Production From Biomass Via Pressurized Gasification Using iCON

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Renewable energy in the form of biomass has been used to produce heat, electricity, steam and petrochemicals due to the zero net carbon emission. With regards to the environmental concerns related to fossil fuel usage, hydrogen has the potential as an alternative clean energy. Currently, production of hydrogen from biomass using a pressurized system is not widely being analyzed and developed yet. Thus, process and flowsheet development of pressurized gasification process of biomass coupled with carbon dioxide adsorption for hydrogen production were investigated. The effect of parameters such as pressure, temperature and steam-to-biomass ratio on the hydrogen yield was investigated. Hydrogen yield is predicted to be increasing with pressure, temperature, and steam-to-biomass ratio in this high pressure gasification system.

PEAP1_GTR_4

A Model for Naphtha Reforming in a Radial Flow Moving Bed Reactor

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Continuous catalytic reforming of naphtha is carried out in a radial flow moving bed reactor to facilitate withdrawal of slowly decaying catalyst for regeneration in another radial flow moving bed reactor followed by catalyst recirculation to the reformer. Though they are extensively used in the petroleum refineries, very little is known about them in the open literature. A one dimensional compartment in series multiphase reactor model is developed to explain the performance of a radial flow moving bed reforming reactor. The model is evaluated with the available information in the literature and possible operating difficulties are discussed.

PEAP1_GTR_5

Adsorptive Storage of Natural Gas a Promising Alternative for Gaseous Fuel Vehicle

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Natural gas is currently gaining a worldwide acceptance as a viable transportation fuel. However, the storage of NG is considered as one of the major drawbacks towards its wide spread usage. A large effort has been invested in many places for the replacement of high-pressure compression CNG traditional storage method by an alternative of adsorptive storage method (ANG) suitable for working at low pressure up to 500 psi (35 atm). Adsorbed natural gas (ANG) is an interesting opportunity for developing natural gas vehicles technology. Many studies are devoted to the elaboration of suitable adsorbent materials to optimize the methane storage capacity. Adsorptive natural gas (ANG) storage is a promising alternative to the traditional compressed natural gas (CNG) storage. Because of its relatively low pressure, ANG has some obvious advantages related to the weight, shape, safety, and cost of the storage vessel. In the present review, a comparison of different research projects in this area is discussed. Carbon based adsorbents were observed to exhibit a remarkable natural gas storage capacity compared to other adsorbents.