# TEKNIK & STRATEGI PENULISAN ARTIKEL ILMIAH

**ASSOC. PROF. DR. EDY HERIANTO MAJLAN, AMICHEME**

https://www.facebook.com/edyhm71

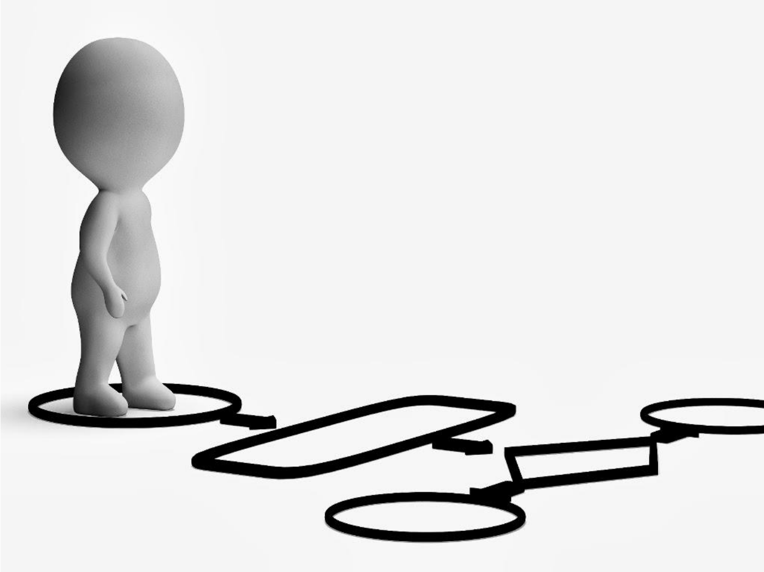
edyhm71@gmail.com

+60166802295

+60166802295/+6282189280306

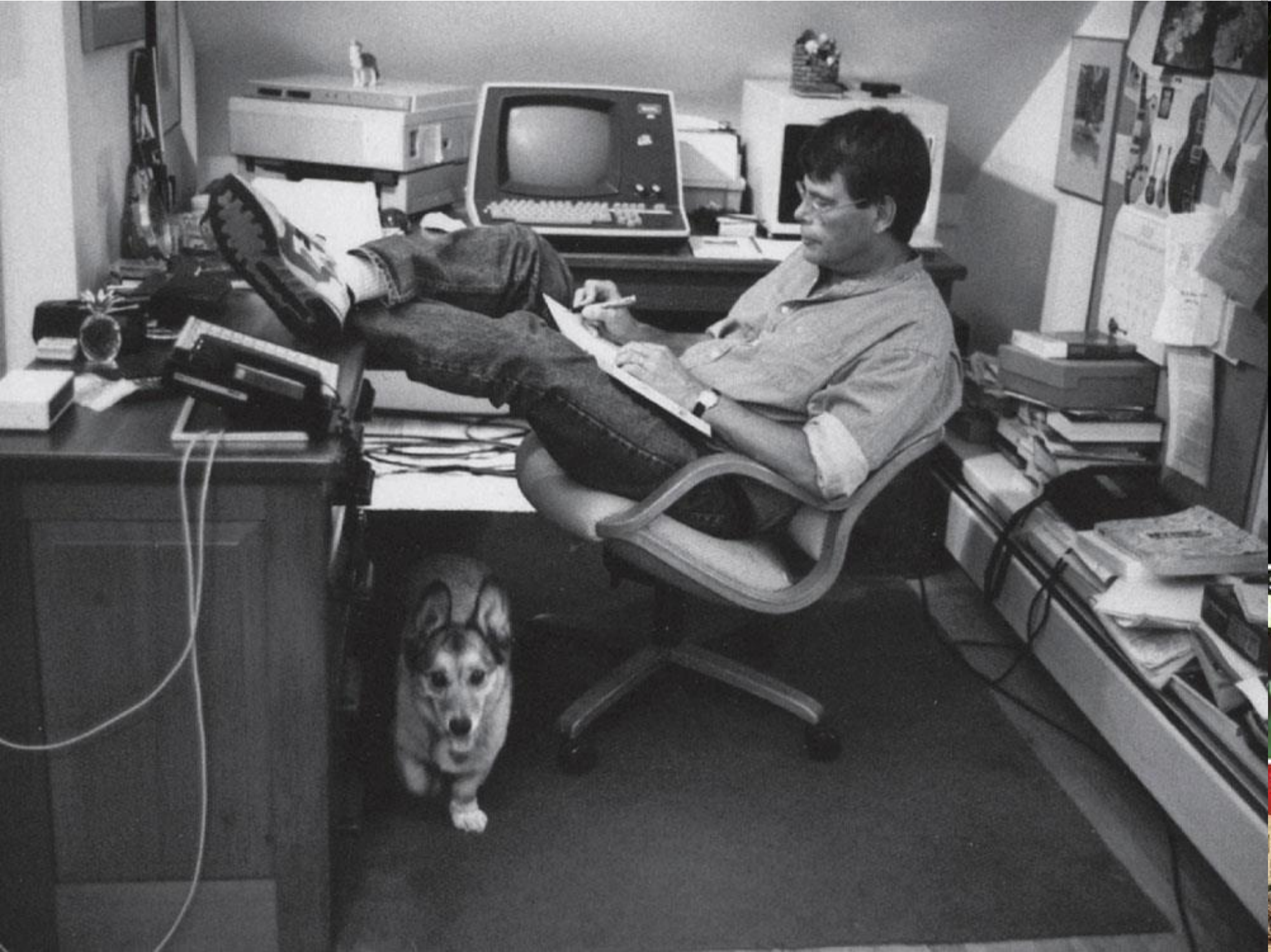
# MYTHS ABOUT WRITING

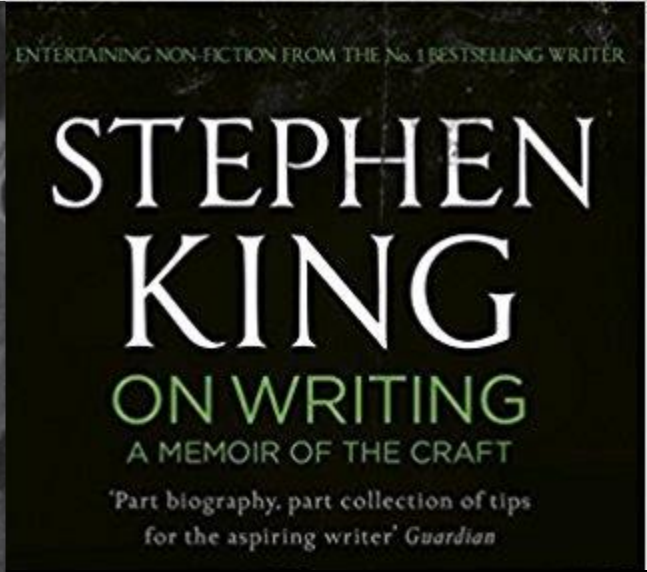
I need a window with an inspirational view (lake, beach etc.) to write



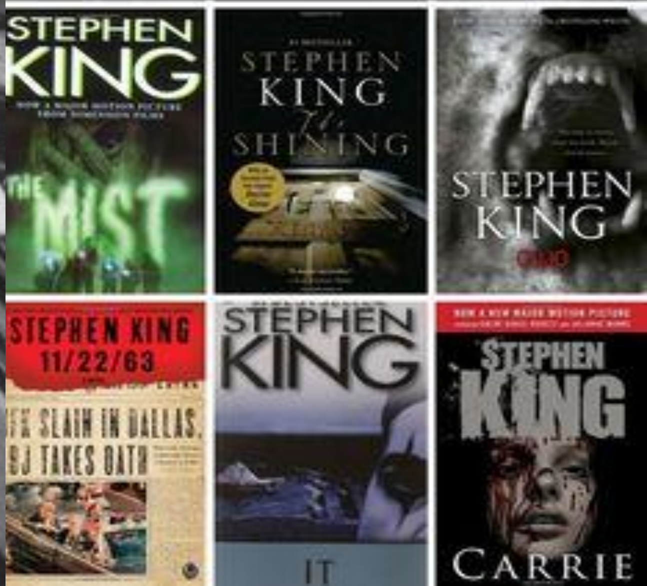
I need a complete plot of the paper/story before I begin writing

I only write when I am in the mood






# The 7 Best Stephen King Books of All Time



# THE 'WRITE' ORDER

Methods
Results

➢ Write during the research

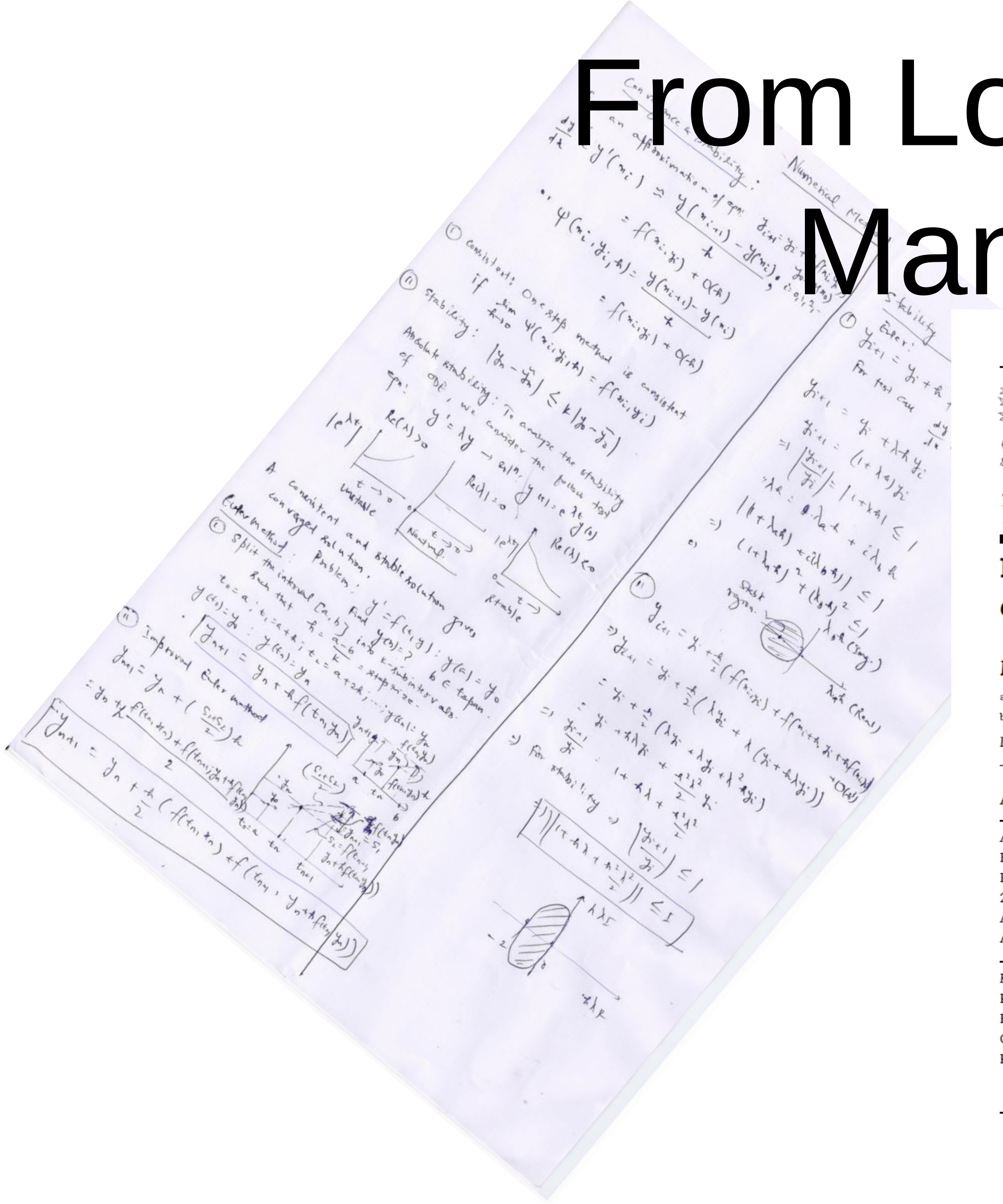
Introduction
Discussion

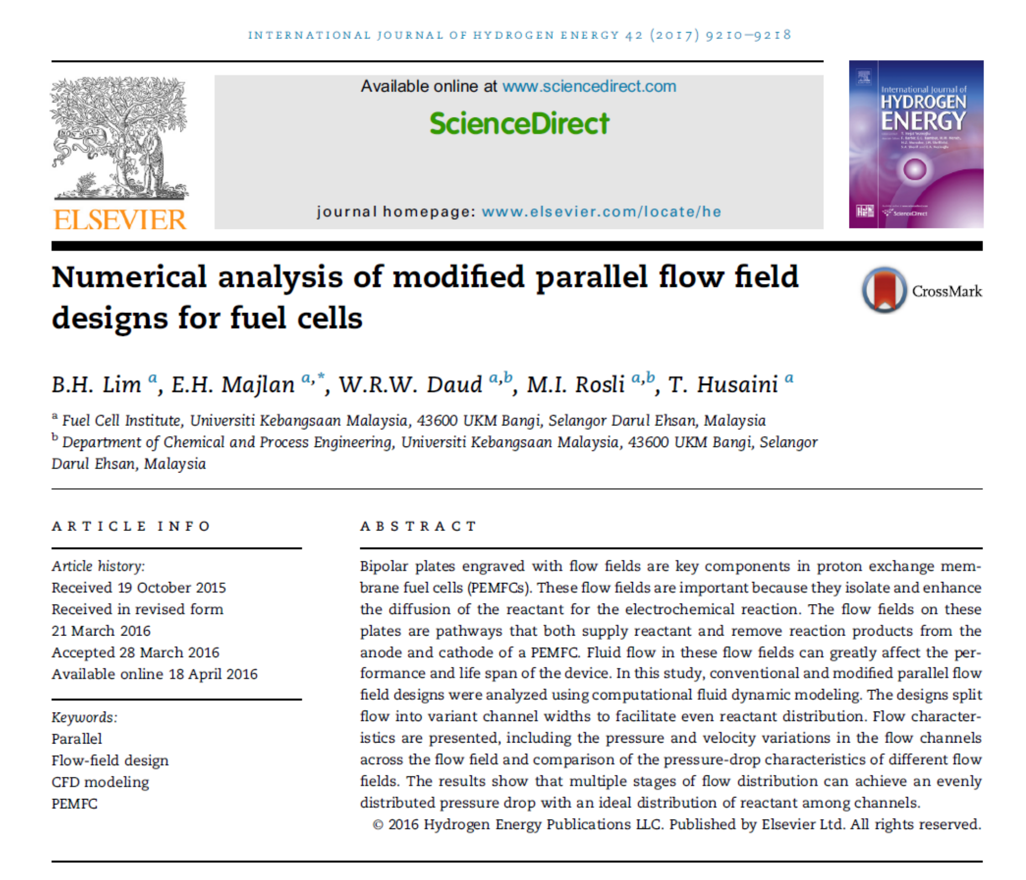
➢ Write after selecting target journal

Tittle
Abstract

➢ Write last

# From Log-Book to Manuscript





INTERNATIONAL JOURNAL OF HYDROGEN ENERGY 42 (2017) 9210–9218

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## Numerical analysis of modified parallel flow field designs for fuel cells

CrossMark

B.H. Lim [a], E.H. Majlan [a,*], W.R.W. Daud [a,b], M.I. Rosli [a,b], T. Husaini [a]

[a] Fuel Cell Institute, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor Darul Ehsan, Malaysia

[b] Department of Chemical and Process Engineering, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor Darul Ehsan, Malaysia

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ABSTRACT

Bipolar plates engraved with flow fields are key components in proton exchange membrane fuel cells (PEMFCs). These flow fields are important because they isolate and enhance the diffusion of the reactant for the electrochemical reaction. The flow fields on these plates are pathways that both supply reactant and remove reaction products from the anode and cathode of a PEMFC. Fluid flow in these flow fields can greatly affect the performance and life span of the device. In this study, conventional and modified parallel flow field designs were analyzed using computational fluid dynamic modeling. The designs split flow into variant channel widths to facilitate even reactant distribution. Flow characteristics are presented, including the pressure and velocity variations in the flow channels across the flow field and comparison of the pressure-drop characteristics of different flow fields. The results show that multiple stages of flow distribution can achieve an evenly distributed pressure drop with an ideal distribution of reactant among channels.

# KOMPONEN-KOMPONEN MANUSKRIP

Pengembangan model **IMRaD**

- ✓ Judul (Title)
- ✓ Penulis (Authors)
- ✓ Abstrak (Abstract)
- ✓ Kata kunci (Key words)
- ✓ **Pengenalan (Introduction)**
- ✓ **Metodologi (Methods)**
- ✓ **Hasil (Results)**
- ✓ **Pembahasan (Discussion)**
- ✓ Rujukan (References)
- ✓ Penghargaan (Acknowledgments)

# TITLE

- Judul adalah bagian pertama yang akan dilihat dan penentu “nasib” artikel
- Pilih yang menarik perhatian
- Menggambarkan secara akurat isi manuskrip
- Membuat orang ingin membaca lebih jauh.

# TITLE

- Buat daftar topik yang dicakup oleh manuskrip
- Tempatkan semua topik bersama dalam judul dengan menggunakan beberapa kata saja.
- Judul yang terlalu panjang akan tampak kikuk, mengganggu pembaca, dan mungkin tidak memenuhi persyaratan jurnal.


# TITLE

- Pikirkan mengapa penelitian Anda akan menarik bagi ilmuwan lain.
- Ini harus terkait dengan alasan Anda memutuskan untuk mempelajari topik ini.
- Jika judul Anda menjelaskan hal ini, kemungkinan akan menarik lebih banyak pembaca ke manuskrip Anda

# TITLE

- Judul yang efektif:
    - Menyampaikan topik utama penelitian
    - Menyoroti pentingnya penelitian
    - Ringkas
    - Menarik pembaca
    - Kata-kata yang “searchable”

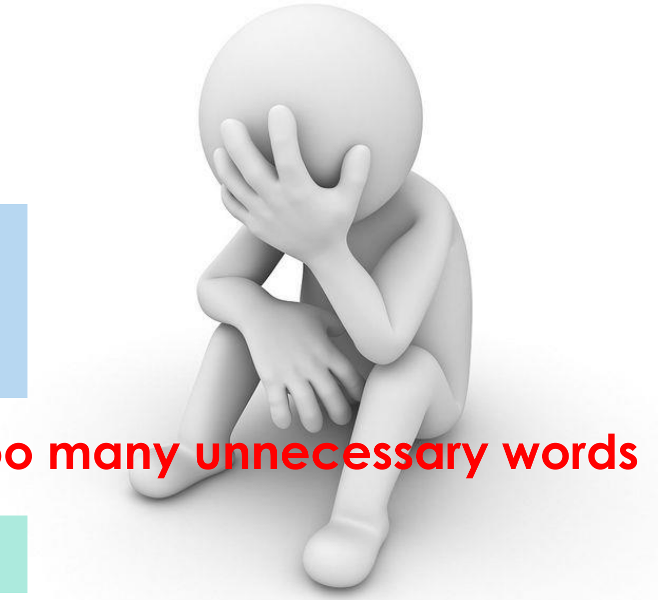

- Kata pertama adalah kata yang paling penting

- Bisa ditentukan sebelum atau sesudah manuskrip ditulis

- Judul bukan kalimat, tidak ada titik setelah judul

# A good title

Does Vaccinating Children and Adolescents with Inactivated Influenza Virus Inhibit the Spread of Influenza in Unimmunized Residents of Rural Communities?



**This title has too many unnecessary words**

Influenza Vaccination of Children: A Randomized Trial

**This title doesn't give enough information about what makes the manuscript interesting**

**Effect of Child Influenza Vaccination on Infection Rates in Rural Communities: A Randomized Trial**

**This is an effective title. It is short, easy to understand, and conveys the important aspects of the research**

# A good title

**Poor**

Late Quaternary evolution ~~of a~~ loess landscape ~~over glacial and interglacial cycles in a region of high~~ tectonic ~~vertical uplift and lateral strike-slip~~ movement ~~in the Cha~~rwell Basin located in ~~the South Island~~ of New Zealand

Too long

**Better**

Late Quaternary loess landscape evolution on an active tectonic margin, Charwell Basin, South Island, New Zealand

Shorter and easy to understand

# TITLE

- Catat beberapa judul yang mungkin, lalu pilih yang terbaik untuk disempurnakan lebih lanjut
- Tanyakan pendapat rekan Anda
- Beri waktu yang cukup untuk melakukan hal ini, akan menghasilkan judul yang lebih baik

# ABSTRACT

- Kebanyakan pembaca akan melihat pada bagian ini setelah judul
- Harus bisa 'berdiri sendiri'
- Ringkasan penelitian dan kesimpulan yang akurat
- Nyatakan arti dan pentingnya riset yang telah dilakukan
- Abstrak berisi hasil atau penemuan penting
- Terstruktur atau tidak terstruktur? **Pastikan** mengikuti "*Guide for Authors*" untuk persyaratan khusus setiap jurnal

# Abstrak yang baik....

- Ringkas
- Sebutkan tujuan dan ruang lingkup penelitian / investigasi **(I)**
- Jelaskan metode yang digunakan **(M)**
- Ringkaskan hasilnya **(R)**
- Nyatakan kesimpulan utama **(D)**
- **Hindari** singkatan kecuali jika perlu
- **Hindari** mencantumkan referensi

## Variational and stochastic inference for Bayesian source separation

A. Taylan Cemgil[a], 1, , Cédric Févotte[b] and Simon J. Godsill[a]

*Abstract.* We tackle the general linear instantaneous model (possibly underdetermined [illegible] nd noisy) where we model the source prior with a Student *t* dist [illegible] he conjugate-exponential characterisation of the *t* distribution as an infinite mixture of scaled Gaussians enables us to do efficient inference. We study two well-known inference metho [illegible] Gibbs sampler and variational Bayes f [illegible] sian source se [illegible] ation. We derive both techniques as local mes [illegible] ge passing algorithms to highlight their algorithmic similarities and to contrast their different convergence characteristics and computational requirements.

Our simulation results suggest that typical posterior distributions in source sepa [illegible] e multiple local maxima. Therefore we propose a hybrid approach where we explore the state space with a Gi [illegible] bs sampler and then switch to a deterministic algorithm. This approach seems to be able to combine the speed of th [illegible] ariational approach with the robustness of the Gibbs sampler.

I

M

R

D

What has been done

What are the main findings

M.X. Zhou, 2008 http://asia.elsevier.com/authorworkshop08/putrajaya

# KEY WORDS

- Pilih kata kunci yang sesuai untuk tujuan pengindeksan → **Sitasi**
- Gunakan kata kunci dan terminologi utama dari literatur dan database
  - MeSH
  - PACS
- **Hindari** istilah umum
- Beberapa jurnal tidak mengizinkan **kata kunci** yang terdapat pada **judul**

# Key Words

Direct observation of nonlinear optics in an isolated carbon nanotube

**Poor**

molecule, optics, lasers, energy

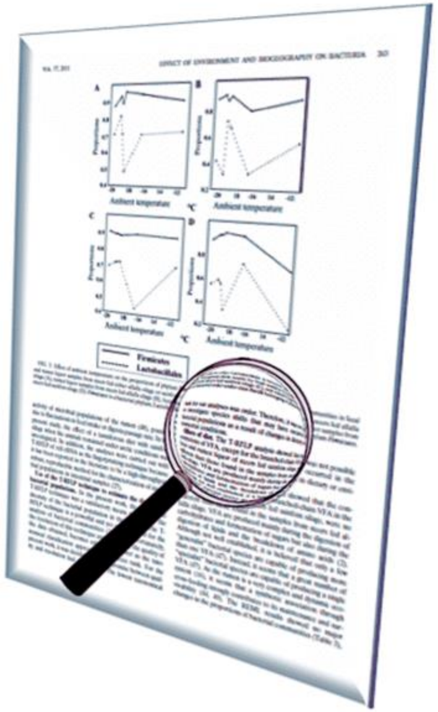
**Too general**

**Better**

single-molecule interaction, Kerr effect, carbon nanotubes, energy level structure

**More specific**

# MAIN TEXT (IMRAD)

- **Introduction -** berisi penelitian sebelumnya yang relevan dan tujuan dari kajian saat ini
- **Methods -** menjelaskan metode preparasi dan teknik karakterisasi
- **Results and Discussion -** membahas hasil utama
- **References -** daftar referensi terkait. Sebaiknya proporsional dengan panjang manuskrip

# TIPS FOR GOOD WRITING

**The first sentence** of each paragraph summarizes the entire paragraph

**One idea in one paragraph**


**Write short sentence**

Sentence with 10 words is easy to read
20 words is difficult to read
30 words is very difficult to read

**Use short words**

Average 4 - 6 characters for each word in a sentence

# INTRODUCTION

**What question (problem) was studied?**

**Jawaban pertanyaan ini adalah isi pada Introduction**

- Latar belakang / perspektif
- Tinjauan Literatur Singkat
- Alasan yang menuntun ke penelitian saat ini
- Pernyataan tujuan
- Gunakan present tense untuk pengetahuan yang sudah mapan
- Kutip artikel terbaru dari jurnal target artikel yang ditulis

# Introduction

THE BEGINNING

- Berikan informasi latar belakang untuk memasukkan kajian yang dilakukan ke dalam konteks
- **JANGAN** menulis tinjauan literatur (*literature review*) yang komprehensif
- **Kutip**/rujuk manuskrip tinjauan literature yang bisa dibaca oleh pembaca jika mereka menginginkan lebih banyak informasi

# Introduction

MIDDLE

- Apa dasar dan alasan/masalah sehingga perlu diadakan kajian ini?
- Jelaskan bagaimana untuk mengatasi masalah kajian (1-2 kalimat)
- **JANGAN** nyatakan hasil dari studi pada bagian ini

# Introduction


- Nyatakan tujuan penelitian dengan jelas
- Nyatakan metode yang akan gunakan untuk mencapai tujuan penelitian
- Apakah kutipan seimbang, aktuil dan relevan?

EXAMPLE

INTERNATIONAL JOURNAL OF HYDROGEN ENERGY 42 (2017) 9210–9218

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# Numerical analysis of modified parallel flow field designs for fuel cells

B.H. Lim [a], E.H. Majlan [a,*], W.R.W. Daud [a,b], M.I. Rosli [a,b], T. Husaini [a]

[a] Fuel Cell Institute, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor Darul Ehsan, Malaysia

[b] Department of Chemical and Process Engineering, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor Darul Ehsan, Malaysia

## Introduction

Nationally, concern has grown about the depletion of fossil fuels and climate changes caused by their burning. The proton exchange membrane fuel cell (PEMFC) has been identified as one of the most effective power systems to substitute for conventional ones in automotive industries [1]. PEMFCs have low emission and high efficiency and appear to be the most promising option to build a future low-carbon environment [2]. Only current, water and heat are produced by PEMFCs through their electrochemical reactions between hydrogen and oxygen.

A bipolar plate in the PEMFC stack acts as its mechanical structure; it holds the membrane electrode assembly for efficient collection and transmission of current and separates the hydrogen and oxygen reactants on the anode and cathode sides [3]. The flow field on the bipolar plate is the path for the reactant to flow and diffuse into the membrane electrode assembly to cause an electrochemical reaction. Uneven flow distribution and a high pressure drop in the flow field design is the most significant design challenge for fuel cells [4]. To achieve maximum power output of a fuel cell, a uniform distribution of the reactant is crucial. Uneven flow distribution in the flow field leads to uneven production of water, heat and current. This, in turn, leads to localized hotspots or flooding within the cell and directly reduces its performance and durability. The flow field also plays an important role in removing the water and heat byproducts produced by the electrochemical reaction. Water remaining in the flow field causes uneven reactant distribution; water in the channels blocks the reactant pathway [5]. A high pressure drop in the flow field design can reduce the flooding effect; however, it also leads to high parasitic power, which reduces the overall efficiency of the cell. Moreover, a high pressure drop also causes cross-leakage of reactant and incurs additional mechanical stresses that damage the cell. Numerous researchers have investigated the effects of various flow field designs to increase PEMFC performance, such as a parallel flow field, a serpentine flow field, an interdigitated flow field and a pin-type flow field [6–9]. Among the different types of flow fields, serpentine and interdigitated fields have received the most attention from researchers. A serpentine flow field with multiple turns in a single path helps force the reactant into the gas diffusion layer to react and also creates a larger pressure drop that enhances the reactant flow from inlet to outlet [10–14]. On the other hand, an interdigitated flow field with a dead-end channel increases the reaction rate by forcing the reactant to diffuse into the gas diffusion layer [15–17]. However, large initial pressures are required for serpentine and interdigitated flow fields to force the reactant into the gas diffusion layer. Historically, it has been known that a parallel flow field has a simple and cost-saving design; however, researchers have not given it much attention. This is because of the poor distribution of reactant of the conventional parallel flow field [18]. More recently, research has been conducted to improve PEMFC performance with parallel flow fields. Bi et al. [19] have experimentally enhanced parallel flow field design by adding a gas flow restrictor channel near the flow field inlet. This improved the flow distribution so that the pressure drop in the flow field channel increased compared to the conventional parallel flow field. Research was also performed numerically on multiple design modifications to the conventional parallel flow field to improve the flow distribution [20]. Among eight design changes that have been reported, it was concluded that the increase in collector area widths, the top and bottom areas of the flow field, can enhance uniform flow distribution. Wang and Wang [21] modified the conventional parallel flow-field design and reported that reducing the ratio of channel area to intake header improves the uniformity of the flow. Reduction of this ratio is achieved by separating the active area into two areas; two inlets and outlets were used.

The objective of this paper is to establish a modified parallel flow-field design for fuel cells for application in automobiles. A large active area is required to achieve the high power output cars need. To ensure a uniform flow distribution in a conventional parallel flow field, multiple inlets are required for a large active area. This is not economical because adding inlets increases the total area of the bipolar plate. Thus, improvement of the modified parallel flow field was performed to minimize the number of inlets and to enhance the flow distribution. Two dimensional numerical simulations were employed to investigate the reactant distribution of the modified parallel flow field compared to the conventional parallel flow field.

* Corresponding author. Tel.: +60 3 89118521; fax: +60 3 89118530.
E-mail addresses: edy@eng.ukm.my, edyhm71@gmail.com (E.H. Majlan).

http://dx.doi.org/10.1016/j.ijhydene.2016.03.189



Tinjauan literature ringkas

latar belakang untuk memasukkan kajian ke dalam konteks

Alasan kajian perlu dilakukan

Bagaimana mengatasi masalah

Tujuan penelitian

Metode yang akan digunakan

# MATERIALS AND METHODS


- Jelaskan metode preparasi dan teknik karakterisasi
- Metode dijelaskan dalam bentuk kalimat ***Past Tense***
- Jadikan ringkas, tapi tetap akurat seperti unit ukuran, volume, replikasi, teknik pengerjaan
- Metode baru harus dijelaskan secara rinci agar peneliti lain bisa mereproduksi percobaan
- Metode yang sudah mapan bisa dijelaskan dengan memetic rujukan

# MATERIALS AND METHODS


- The basic principle: to provide **sufficient information** so that a knowledgeable reader can **reproduce** the experiment, or the derivation.
  - **Empirical papers**
    - material studied, area descriptions
    - methods, techniques, theories applied
  - **Case study papers**
    - application of existing methods, theory or tools
    - special settings in this piece of work
  - **Methodology papers**
    - materials and detailed procedure of a novel experimentation
    - scheme, flow, and performance analysis of a new algorithm
  - **Theory papers**
    - principles, concepts, and models
    - major framework and derivation

# MATERIALS AND METHODS


**Materials and methods**

***Materials.*** Culture media were obtained from Life Technologies (Gaithersburg, MD). Okadaic acid was purchased from Alexis Company (Läufelfingen, Switzerland). Antibodies to MEK1/2 and phosphorylated MAPK were purchased from New England Biolabs (Beverley, MA).

**Materials described first**
**Suppliers/locations given**

***Induction of cell death.*** Cell death was induced as described previously [15]. Briefly, cell death was induced by adding okadaic acid (0-300 nM, Alexis Co.) after washing slice cultures in serum-free medium.

**Clear subheadings**
**Refs used to save space**

***Light and electron microscopy.*** Cultures were fixed in 2.5% glutaraldehyde and 1% formaldehyde, treated with 1% $OsO_4$ in 0.1 M phosphate buffer, pH 7.4, dehydrated in a graded series of ethanol and propylene oxide, and flat-embedded in an epoxy resin (Durcupan ACM, Fluka, Neu-Ulm, Germany). Semithin sections were stained with toluidine blue, and ultrathin sections were stained with 1% uranyl acetate for 20 min and 1% lead citrate for 2 min.

**Enough information to reproduce the experiment**

***Statistics.*** For statistical analysis, 2-tailed Student's *t* test was used to assess the significance of mean differences. Differences were considered significant at a *P* value of 0.05 or less.

**Statistical test parameters provided**

INTERNATIONAL JOURNAL OF HYDROGEN ENERGY 40 (2015) 10960–10968

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# Effects of temperature and backpressure on the performance degradation of MEA in PEMFC

D. Rohendi [a], E.H. Majlan [b,*], A.B. Mohamad [b,c], W.R.W. Daud [b,c], A.A.H. Kadhum [b,c], L.K. Shyuan [b]

[a] Dept. of Chemistry, Faculty of Mathematics and Sciences, Sriwijaya University, Inderalaya, Indonesia
[b] Fuel Cell Institute, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor DE, Malaysia
[c] Dept. of Chemical and Process Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor DE, Malaysia

## 2. Material and methods

The materials used to manufacture the electrodes were P75T CPS carbon paper (Ballard, USA) as a gas diffusion media (GDM) or macroporous layer (first layer), carbon black-Vulcan XC72 (Cabot, USA) as carbon substrate, PTFE solution (60 wt%, DuPont, USA), Nafion Solution (5 wt%, DuPont, USA), Pt/C (20 wt%, PMC, USA), MPL and CL. The MPL of the second layer electrode was made by ultrasonicating carbon black – Vulcan XC72 (3.0 mg cm$^{-2}$), isopropyl alcohol (IPA) and ammonium bicarbonate (50 wt%) for 17 min, then incorporating 30 wt% PTFE for carbon mass and sonicating for an additional 5 min. The resulting ink was sprayed uniformly onto the carbon paper and then placed in a furnace at 350 °C for 3 h. The third layer of the electrode was a CL with a platinum content at the anode of 0.1, 0.3, 0.5, 0.7 and 0.9 mg cm$^{-2}$ with a constant platinum content at the cathode of 0.7 mg cm$^{-2}$. The CL consists of three layers: The first layer was made by mixing half of the total Pt/C content with 20 wt% PTFE and IPA, spraying the mixture onto the GDL and sintering at 350 °C for 3 h. The second catalyst layer consists of remaining Pt/C, IPA and 17.5 wt% Nafion for the anode with 15 wt% for the cathode. The third layer consists of 17.5 wt% Nafion and the IPA. The resulting electrodes were analyzed and characterized using SEM–EDX (Zeiss Supra-55 VP).

The cathode and anode with an active area of 25 cm$^2$ were combined using nafion membranes 212 (NR212) and nafion membranes 112 (N112) for comparison (DuPont, USA), to create the MEA. The performance of the MEAs was tested in a multiple-serpentine flow channel pattern cell using GasHub fuel cell station both with and without back pressure and varying the cell temperature, catalyst content and membranes. Electrochemical characterization of the MEAs was performed using electrochemical impedance spectroscopy (EIS) with a Metrohm Autolab PGSTAT128N (Netherlands). Pure hydrogen gas was supplied to the anode at a flow rate of

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# Hydrogen purification using compact pressure swing adsorption system for fuel cell

Edy Herianto Majlan[a,*], Wan Ramli Wan Daud[a], Sunny E. Iyuke[b], Abu Bakar Mohamad[c], A. Amir H. Kadhum[c], Abdul Wahab Mohammad[c], Mohd. Sobri Takriff[c], Nurhaswani Bahaman[a]

[a] Fuel Cell Institute, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor DE, Malaysia
[b] School of Chemical and Metallurgical Engineering, University of the Witwatersrand, Johannesburg ... Africa
[c] Chemical and Process Engineering Dept., Faculty of Engineering, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor ... Malaysia





Table 1 – Specification of CPSA system.

2.2. Experiment

2. Material and experiment

2.1. Material and equipment



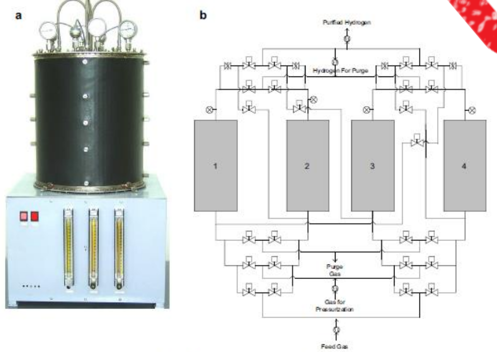


Fig. 1 – (a) CPSA system, (b) schematic CPSA.

Table 2 – Original adsorbents.



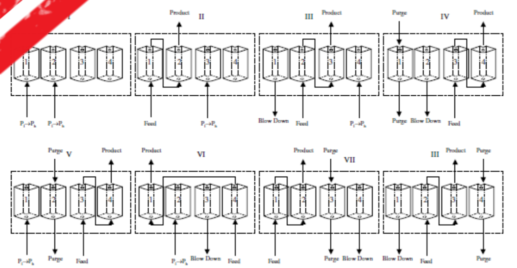


Fig. 2 – CPSA cyclic process for dual bed system (P$_L$: low pressure; P$_H$: high pressure).

3. Results and discussion

3.1. Choice of adsorbent

Table 3 – The capacity of the adsorbent in the CO and CO$_2$ adsorption process.

Table 4 – Activated carbon (Sigma–Aldrich) characterization.

# RESULTS

- Rangkai hasil penelitian berdasarkan urutan/susunan logis untuk membentuk sebuah 'cerita'
- Gunakan sub judul
- Gunakan kalimat ***Past Tense*** untuk menggambarkan hasilnya
- Jika merujuk kepada angka dan table, gunakan kalimat ***Present Tense***
- Tujukkan fakta/data, **JANGAN** diskusikan hasilnya
- Penggunaan Tabel dan Angka
- **JANGAN** duplikat data yang sama dalam gambar, tabel dan teks

# **Results…….** Apa yang telah didapat?

**Results**

***Okadaic induces death of dentate gyrus neurons selectively.*** Hippocampal slice cultures treated with OA (1–300 nM) showed selective cell death of neurons in the dentate gyrus, but neurons in the CA1–3 regions were largely unaffected. Cell death occurred in a time- and dose-dependent manner. Propidium iodide staining of treated slides indicated….

**Clear subheadings**

Electron microscopy revealed a number of ultrastructural changes in hippocampal pyramidal neurons, particularly those in the CA3 region, in slices treated with 300 nM OA for 24 h (Fig 3). These changes included slight nuclear aggregations (arrow in Fig 3A), accumulation of mitochondria around nuclei (arrowheads in Fig 3B) and an increased amount of endoplasmic reticulum (Fig 3C). As shown in Figure 4, the nuclei of pyramidal neurons in the CA1 and CA3 regions…

**Graphics used to save space**

***Involvement of MAPK signaling in the effect of OA.*** Compared with slices treated with medium only and treated slices at 0 h, slices treated with 300 nM OA showed increasing levels of phosphorylated MAPK at 4 h, 8 h, 16 h and 24 h, with no corresponding change in the levels of total MAPK. This increase was prevented in slices that were co-incubated with a protein kinase inhibitor. In addition, the levels of phosphorylated Tau were higher in OA- treated slices than in control slices…

**Clear comparisons made**

# DISCUSSION

## Apa arti hasil kajian dan apa implikasinya?

### Jawaban atas pertanyaan ini adalah dalam Diskusi

- Bagian tersulit bagi kebanyakan penulis
- Tunjukkan/jelaskan dasar, hubungan dan generalisasi yang ditunjukkan oleh hasil kajian
- Ringkaskan dan diskusikan hasil kajian - **JANGAN** hanya mengulanginya
- Bentuk ***Past tense*** untuk menggambarkan hasilnya
- Bentuk ***Present tense*** untuk menggambarkan implikasinya

# Discussion


- Menjawab pertanyaan penelitian (***Research question***)
- Sajikan hasil kajian utama terlebih dahulu
- Berikan kesimpulan, berdasarkan hasil kajian

MIDDLE

# Discussion

- Interpretasikan hasil kajian
  - 1 paragraf per ide
  - Apa yang ditunjukkan oleh pengamatan / hasil kajian?
- Apakah ada hasil dari penelitian sebelumnya yang relevan dengan hasil kajian?
- Bandingkan dengan kajian orang lain
  - Sama atau berbeda?
  - Apa alasannya?

# Discussion


- Jika ada hasil yang meragukan dan berbeda dengan  peneliti yang lain, tampilkan secara objektif
- Jelaskan penemuan tak terduga dengan kemampuan terbaik
- Jelaskan limit/kekurangan kajian, Ini akan memberi kredibilitas pada manuskrip

# Discussion


- Jangan melebih-lebihkan pentingnya hasil kajian
- Gunakan bahasa rendah hati
  - Our findings **prove** that…
  - Our findings **show** that…
  - Our findings **suggest** that…

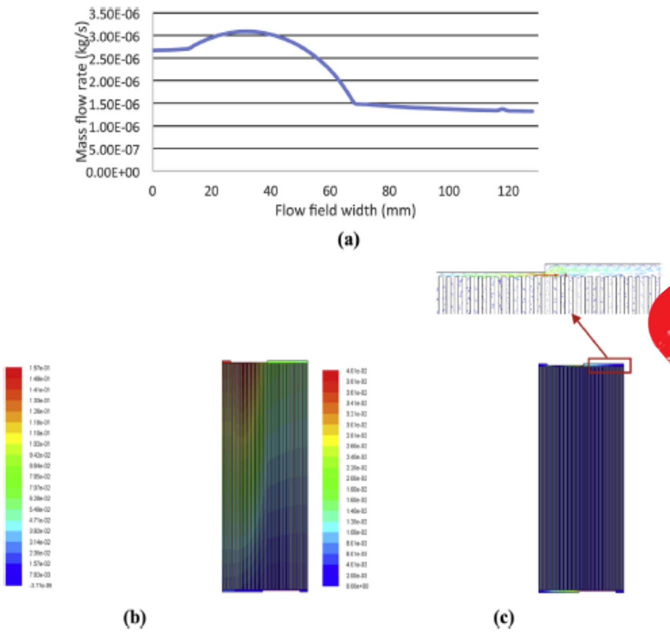



**Fig. 3** – **Numerical results of conventional parallel flow field with single inlet/outlet: (a) mass flow rate across the flow field, (b) total pressure, (c) velocity magnitude.**

double inlet/outlet, 337,578 elements. The velocity and pressure distributions of the four flow field designs were compared using simulation models.

## Results and discussion

Simulation results of the modified and conventional parallel flow fields were analyzed using the pressure and mass flow rate distributions across the widths of the fields. Figs. 3 and 4 show the mass flow rate distributions across the flow field width and contour plots of the conventional parallel flow field, respectively. The mass flow rate graph was plotted from the results of velocity contours.

From Figs. 3(a) and 4(a), the flow distribution of the conventional parallel flow field is concentrated in the channels nearest the inlet and outlet. This resulted in an uneven flow distribution in which less reactant is distributed into the other channels. Pressure gradually decreases for both conventional flow fields, though a slightly concentrated high pressure was observed on the left of single inlet/outlet conventional flow field. This concentrated high pressure is due to the higher reactant flow rate in that area. From the velocity magnitude contour in Figs. 3(c) and 4(c), velocity is high near the inlet and outlet areas. The velocity vector profile in Fig. 3(c) moved horizontally near the right inlet area. This is because the flow moved towards the channels not directly facing the inlet. Concentrated horizontal flow was further divided into the remaining channels on the right area, and Fig. 3(a) shows that the remaining channels had a lower mass flow rate than channels in the left area. In Fig. 4(c), the velocity vector shows that the flow was split and moved in the top and bottom directions. This phenomenon occurred because of the rib blockage near the inlet entrance. It demonstrated that higher velocity flowed to the top area, and the flow divided into the remaining channels. However, Fig. 4(a) clearly shows that the first channel on both sides of the inlets has the highest flow rate relative to the remaining channels.

The results of the conventional parallel flow field as shown in Fig. 4 are comparable with a research study reported by Imbrioscia et al. [20], where the flow tends to


**Fig. 4** – **Numerical results of convention… width, (b) total pressure, (c) velocity ma…**

move towards the channels nearest t… Improvements to the conventional para… have been made to enhance the flow dis… was given to the division of flows across… modifications of the parallel design we… the flow field into three sections to… division.

Simulation results of the modified p… single and double inlets/outlets are show… Figs. 5(a) and 6(a), the distributions of the… evenly among the channels. The pressure… from inlet to outlet. Fig. 5(c) shows that velocity is constant from the inlet to the channels. There was only a slight concentration of high velocity on the left sides near the inlets. This was probably due to high pressure caused by the flow blockage of the second rib on the left. The high pressure



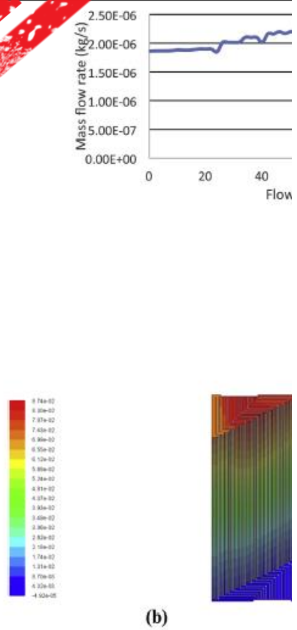



**Fig. 5** – **Numerical results of modified parallel flow field wi… width, (b) total pressure, (c) velocity magnitude.**

resistance among channels. For a contour plot of pressure, see Fig. 5(b); the modified single inlet/outlet field evenly distributes the pressure near the inlet, and pressure is shown to decrease gradually. This can help in purging water from channels in the PEMFC.

The modified double inlet/outlet parallel flow field, also demonstrates improved reactant distribution among channels (Fig. 6(b)). The conventional double inlet/outlet field has a higher flow rate in the first and last channels due to a rib blocking the flow. Moreover, reactant tends to choose the shortest channel path from inlet to outlet. Thus, Fig. 4(a) shows a higher flow rate in the first channel on each side of the inlets. Flow distribution was improved by modifying the double inlet/outlet field to distribute the reactant by stages and by having similar flow path lengths to create similar pressure drops. The longest channels were in the center area of the modified double inlet/outlet field. The left and right inlets both distribute to the center area of channels and

inlet/outlet field, modification of the parallel flow field design improves the reactant distribution. The distribution of reactant among channels is more uniform in Fig. 5(a) than that in Fig. 3(a). The reactant distributed in stages helps to create similar channel lengths that further lead to uniform flow



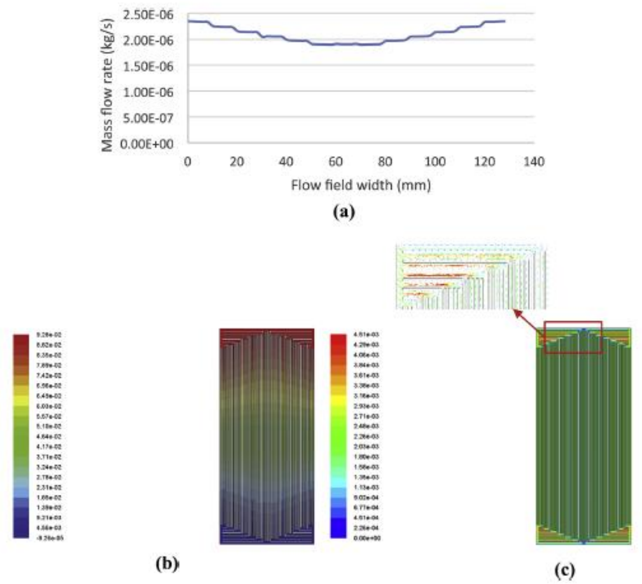



**Fig. 6** – **Numerical results of modified parallel flow field with single inlet/outlet: (a) mass flow rate across the flow field width, (b) total pressure, (c) velocity magnitude.**

where P is pressure, $\vec{S}$ is the area on which the pressure acts, and $\vec{F_f}$ is wall shear stress. In the equation of steady state flow, the sum of the mass balance is equal to the net momentum flow rate and net forces of pressure and wall shear stress. Fig. 7 shows the control volume of the model of the single inlet/outlet configuration. The momentum balance equation can be further developed as follows:

$$-\dot{m}V = (P_1 - P_2)S - F_f$$

$$-\dot{m}V = -\Delta PS - F_f$$

$$\Delta P = \frac{\dot{m}V - F_f}{S}$$

where $\dot{m}V$ is the inlet momentum flow rate, $F_f$ is the friction force generated by the fluid flow, and S is the pressure action area. Thus, the final momentum balance equation shows that pressure difference between the inlet and outlet is due to the friction force generated during the flow across the field. For the double inlet/outlet model, the momentum balance equation is the same as for the single inlet/outlet configuration

$$\sum \dot{m}\vec{V} = \sum -P\vec{S} + \sum \vec{F_f}$$

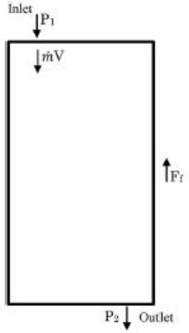


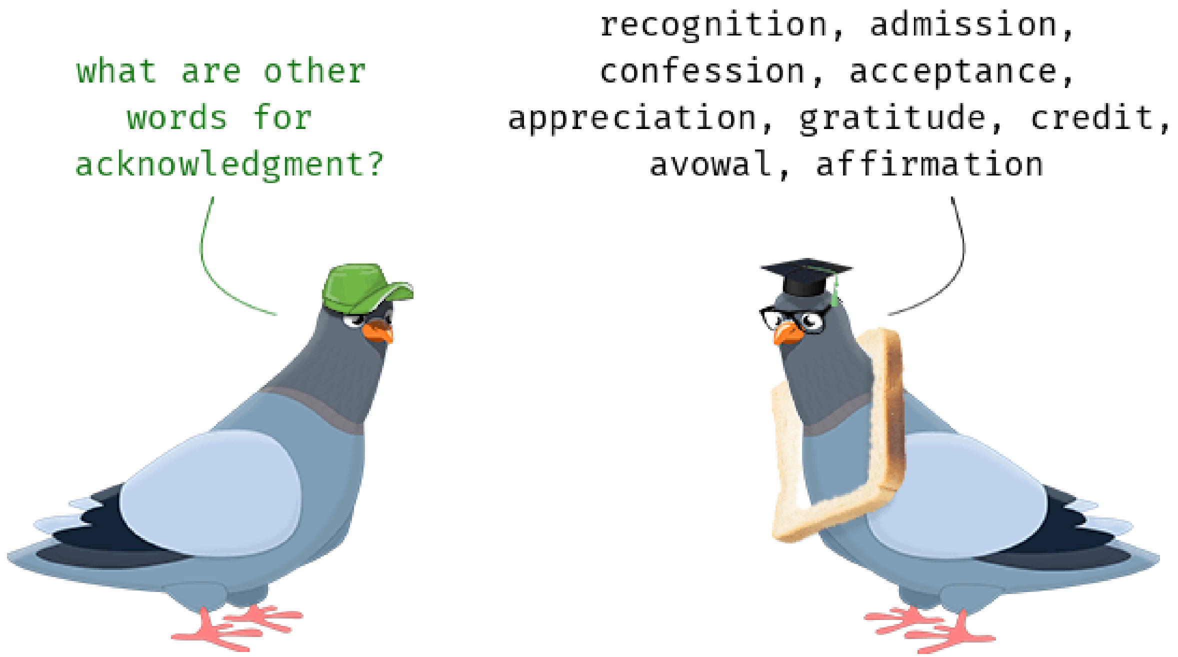

**Fig. 7** – **Schematic of single inlet/outlet configuration control volume.**

# CONCLUSIONS

- Boleh dimasukkan dalam bagian terakhir dari diskusi
- Tuliskan fakta terpinting, agar editor dan reviewer tidak ada sebab untuk menolak manuskrip
- Biasanya tidak ada referensi
- Nyatakan kemungkinan aplikasi, implikasi dan spekulasi, jika sesuai
- Beri saran untuk penelitian selanjutnya, jika perlu

# ACKNOWLEDGEMENTS

- ➢Nama dana penelitian, Institusi pemberi nama,
- ➢Pemberi fasilitas (Universitas, Institusi)
- ➢Nama orang/group yang membantu



# REFERENCES

- **PASTIKAN** format rujukan mematuhi “Guide for Authors” dari jurnal target
- Pemformatan diperlukan untuk rujukan di dalam teks dan di bagian daftar referensi
- Gunakan software manajemen referensi (RefWorks, Mendeley, EndNote, Zotero, Papers)





because the inlet mass flow rates of the left and right sides are always equivalent.

## Conclusion

Modified and conventional parallel flow fields across fuel cell plates have been studied numerically with ANSYS Fluent software. A comparison of the modified and conventional flow fields predicts that a modified parallel flow field has better reactant distribution capability than a conventional parallel flow field. The modified field was designed to distribute the channels into multiple stages to ensure even distribution of flow. Channel widths were reduced from the inlet to the mid-section. In the outlet area, the channel width was increased to create a large pressure drop to help both uniform flow distribution and water purging. Simulation results showed that the modified parallel flow field can distribute the flow evenly and reduce pressure gradually from inlet to outlet. An even distribution of reactant and pressure in a flow field maximizes the performance of a PEMFC because the total active area is utilized. Comparison of both modified parallel flow fields showed that the single inlet/outlet design was better than the double because the single inlet/outlet had the same channel length in the 1 mm channel area. In contrast, the double inlet/outlet had various channel lengths. Variation of channel lengths can cause non-uniform distributions of flow; hence, the single inlet/outlet generated a more uniform flow distribution.

## Acknowledgment

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# TAMPILAN TABEL & GAMBAR

- Gambar dan tabel **SANGAT EFEKTIF**
- Jaga agar tetap sederhana
- Hindari duplikasi dengan teks
- Beri label pada semua bagian dari gambar
- Sertakan trendlines, skala bar dan signifikansi statistik
- Keterangan table dan gambar harus bisa **'berdiri sendiri'**

# Tampilan tabel

Table 1 Percentages of cells that were dead as indicated by propidium iodode within a single field-of-view (40.000 μm²) using a 40x objective lens in hippocam pal slices treated with a variety of concentrations of okadaic acid. Data are means ±SD for 20 fields of view per treatment and region.

| Treatment | CA1 | CA2 | CA3 | DG |
|---|---|---|---|---|
| 0 nM OA (medium only) | 1.5±0.7 | 1.7±0.3 | 1.2±0.9 | 1.6±0.4 |
| 10 nM OA | 1.6±0.9 | 1.6±0.4 | 1.6±1.1 | 2.5±0.9 |
| 75 nM OA | 1.9±1.1 | 1.9±0.6 | 2.1±1.2 | 11.9±1.2 |
| 150 nM OA | 1.6±0.9 | 1.6±0.4 | 1.6±1.1 | 2.5±0.9 |
| 300 nM OA | 1.4±0.9 | 1.7±0.4 | 1.6±1.8 | 2.5±0.8 |

OA = okadic acid; CA1 CA1 – CA3 regions of th hippocampus;
DG = the dentate gyrus of the hippocampus

Clear concise legend / caption

Data divided into categories for clarity

Abbreviations defined

# Tampilan tabel

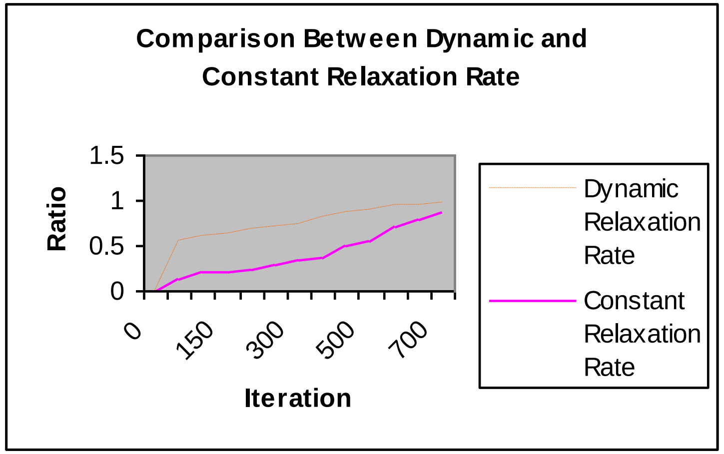
| Samples | $T_c$/K | $\theta_D$/K | $\lambda_{BCS}$ | $\lambda_{VH}$ |
|---|---|---|---|---|
| $GdBaSrCu_3O_{7-\delta}$ | 87 | 385 | 0.62 | 0.044 |
| $GdBaSr(Cu_{2.99}Zn_{0.01})O_{7-\delta}$ | 84 | 420 | 0.58 | 0.041 |
| $GdBaSr(Cu_{2.97}Zn_{0.03})O_{7-\delta}$ | 82 | 449 | 0.55 | 0.040 |
| $GdBaSr(Cu_{2.94}Zn_{0.06})O_{7-\delta}$ | 73 | 440 | 0.52 | 0.038 |
| $GdBaSr(Cu_{2.9}Zn_{0.1})O_{7-\delta}$ | NS | 452 | - | - |
| $DyBaSrCu_3O_{7-\delta}$ | 82 | 464 | 0.54 | 0.039 |
| $(Dy_{0.9}Pr_{0.1})BaSrCu_3O_{7-\delta}$ | 75 | 400 | 0.56 | 0.040 |
| $(Dy_{0.8}Pr_{0.2})BaSrCu_3O_{7-\delta}$ | 59 | 374 | 0.51 | 0.038 |
| $(Dy_{0.6}Pr_{0.4})BaSrCu_3O_{7-\delta}$ | 28 | 402 | 0.36 | 0.028 |
| $(Dy_{0.3}Pr_{0.7})BaSrCu_3O_{7-\delta}$ | NS | 434 | - | - |
| $TlSr_2(Ca_{0.7}Y_{0.3})Cu_2O_{7-\delta}$ | 71 | 400 | 0.54 | 0.039 |
| $TlSr_2(Ca_{0.5}Y_{0.5})Cu_2O_{7-\delta}$ | 73 | 396 | 0.55 | 0.040 |
| $TlSr_2(Sr_{0.7}Y_{0.3})Cu_2O_{7-\delta}$ | 81 | 433 | 0.56 | 0.040 |
| $TlSr_2(Sr_{0.5}Y_{0.5})Cu_2O_{7-\delta}$ | 87 | 454 | 0.56 | 0.041 |
| $TlSr_2(Ca_{0.5}Pr_{0.5})Cu_2O_{7-\delta}$ | 90 | 342 | 0.69 | 0.046 |

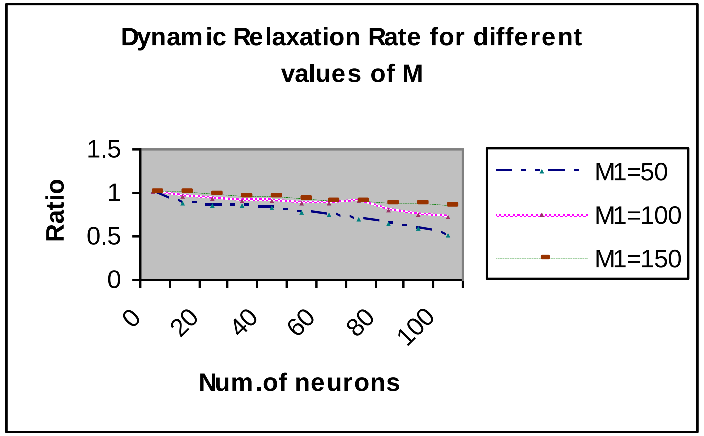
Text/Label – justify left

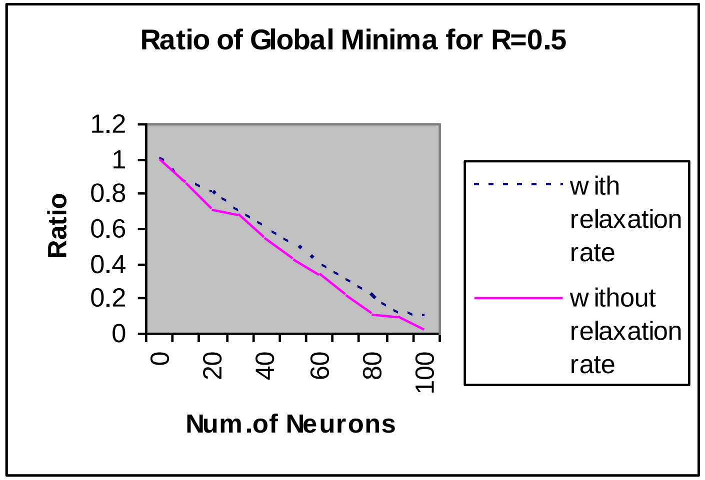
Significant figures and decimal points are consistent

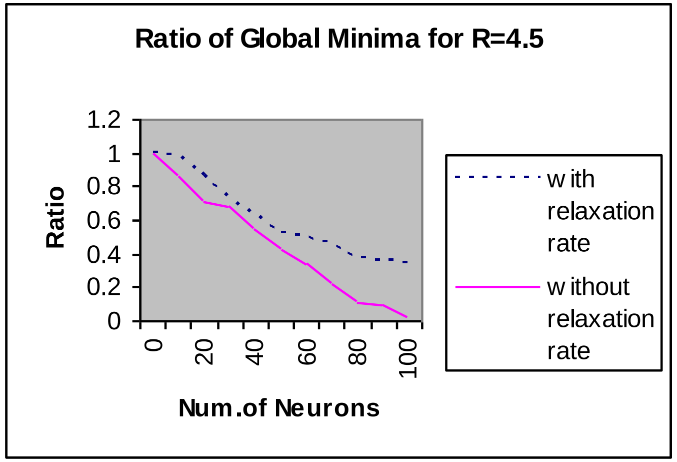
Align the decimal point
Justify right

# Tampilan gambar



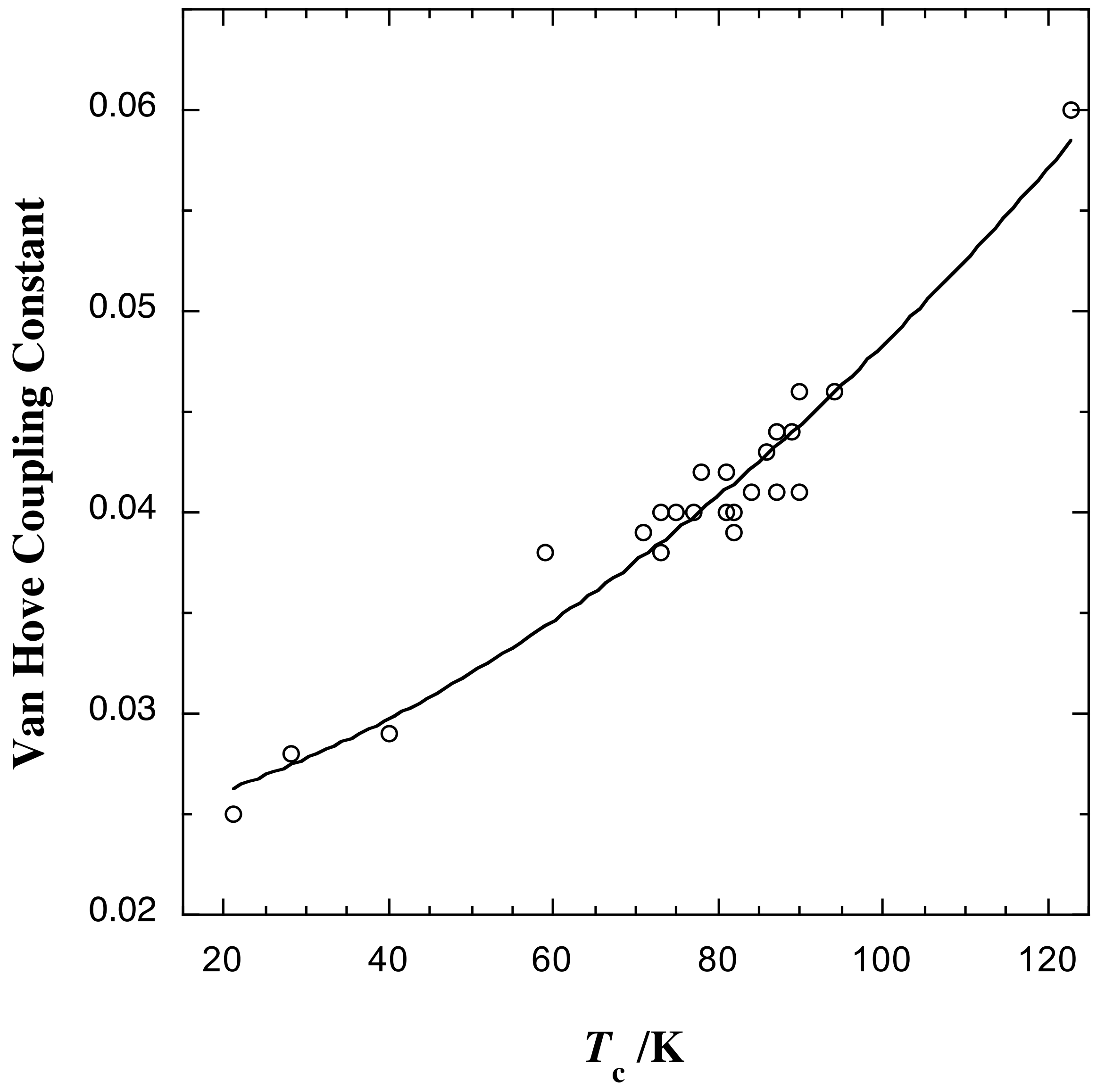



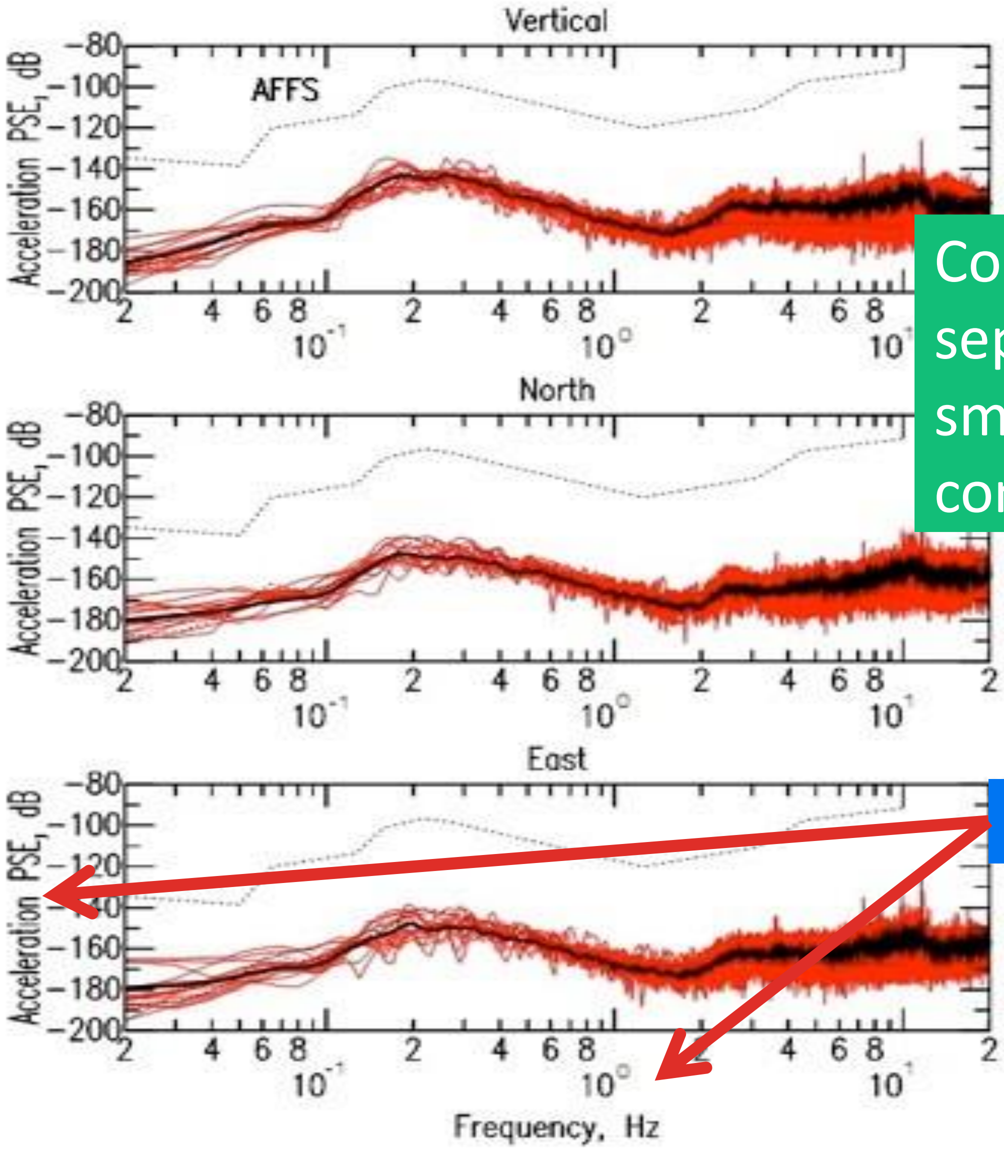


# Tampilan gambar



# Tampilan gambar

Multiple panels: sets of related data are shown in a single figure




Complicated data separated into smaller and simpler components

Axes clearly labeled

Clear, 'stand alone' legend

**Fig 4.** Noise spectra at station A Acceleration power spectra (in decibels relative to 1 m2/s4) are shown for the vertical, north and east components. Individual spectra are shown in *red* and the average spectra in *black*. Also shown are the average low and hign noise spectra (*dotted line*) of Peterson (1993)

Arab J Geosci (2008) 1:1–15

# Tampilan gambar



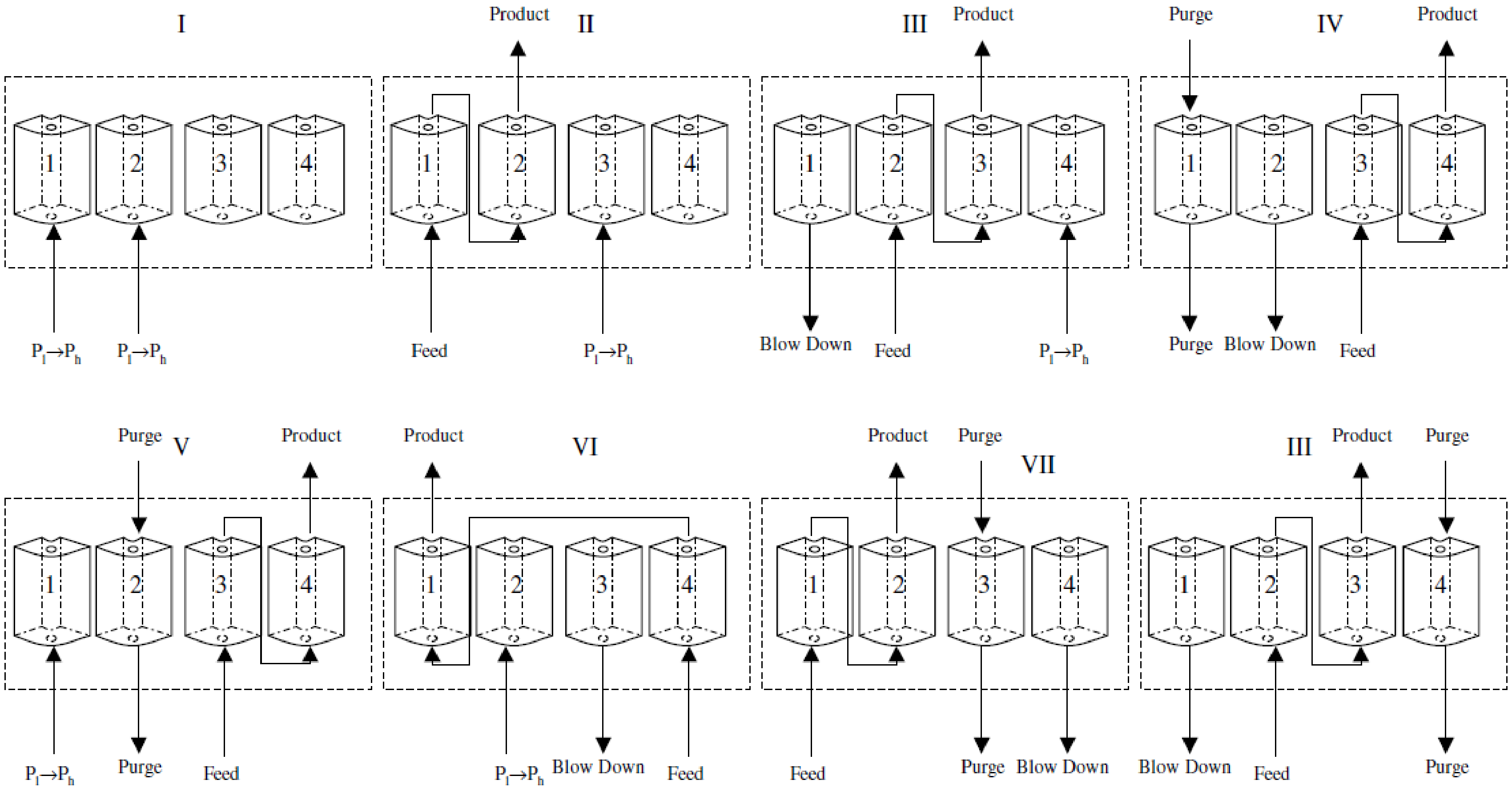
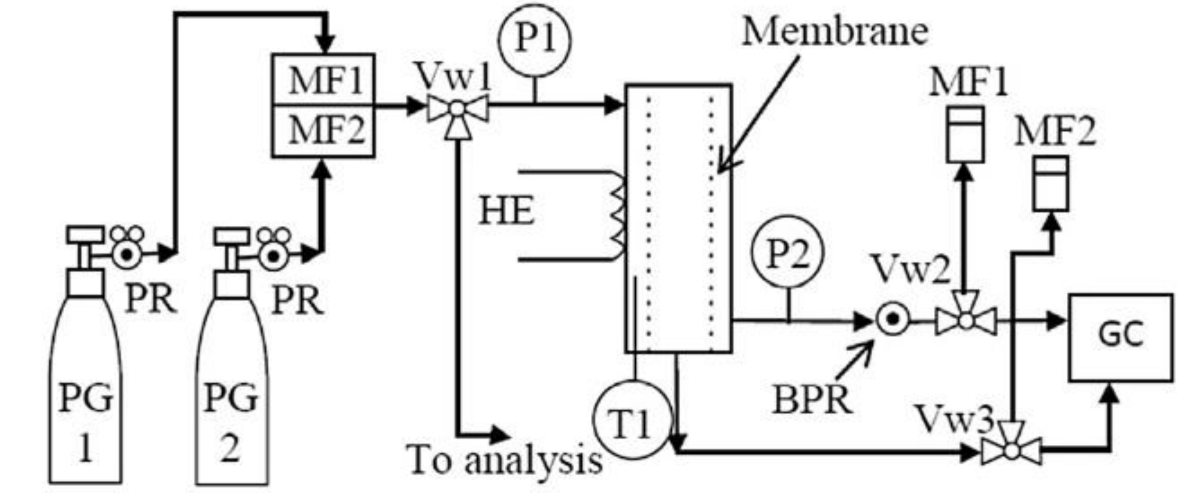



**Fig. 2 – CPSA cyclic process for dual bed system ($P_l$: low pressure; $P_h$: high pressure).**

# Tampilan gambar




BPR – Back Pressure Regulator
PG1,PG2 – Pure Gas
BPR – Back Pressure Regulator
MF1, MF2 – Flow Meter
Vw1,Vw2,Vw3 – 3-Way Valves
MF1, MF2 – Mass Flow Controller
PR – Pressure Regulator
P1, P2 – Pressure Indicator
T1 – Temperature Indicator
HE – Heating Element
GC – Gas Chromatography

**Fig. 5 – Experimental setup for gas permeation test system.**

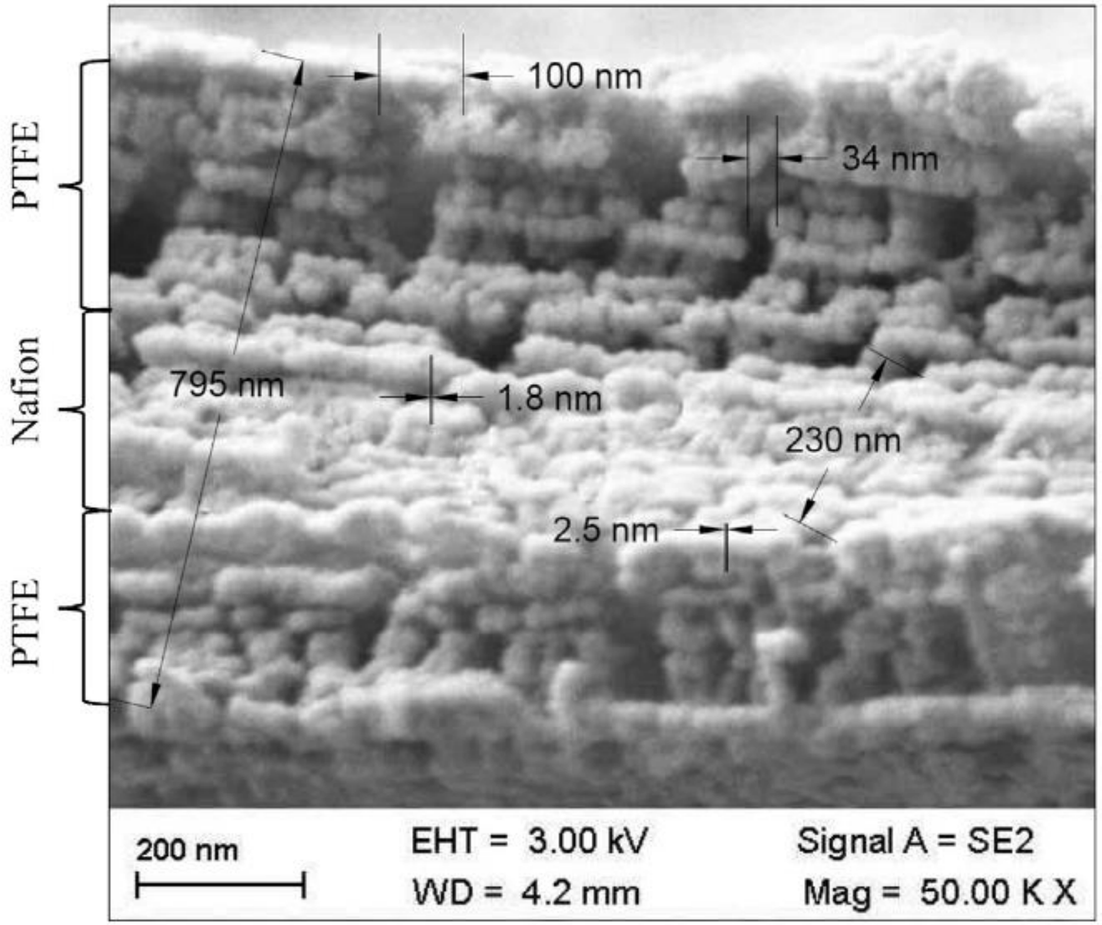
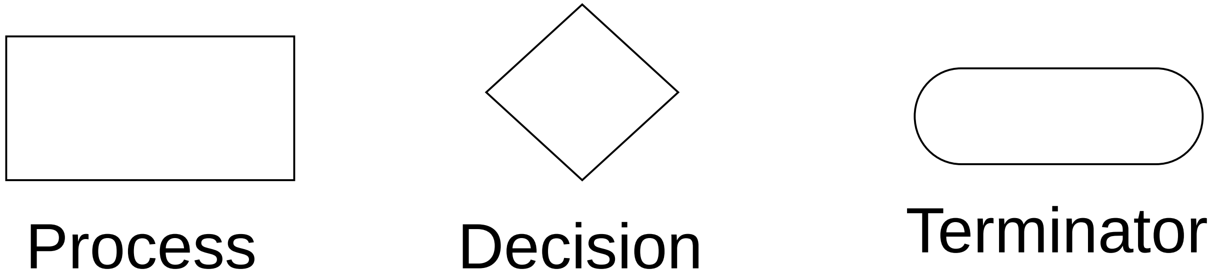


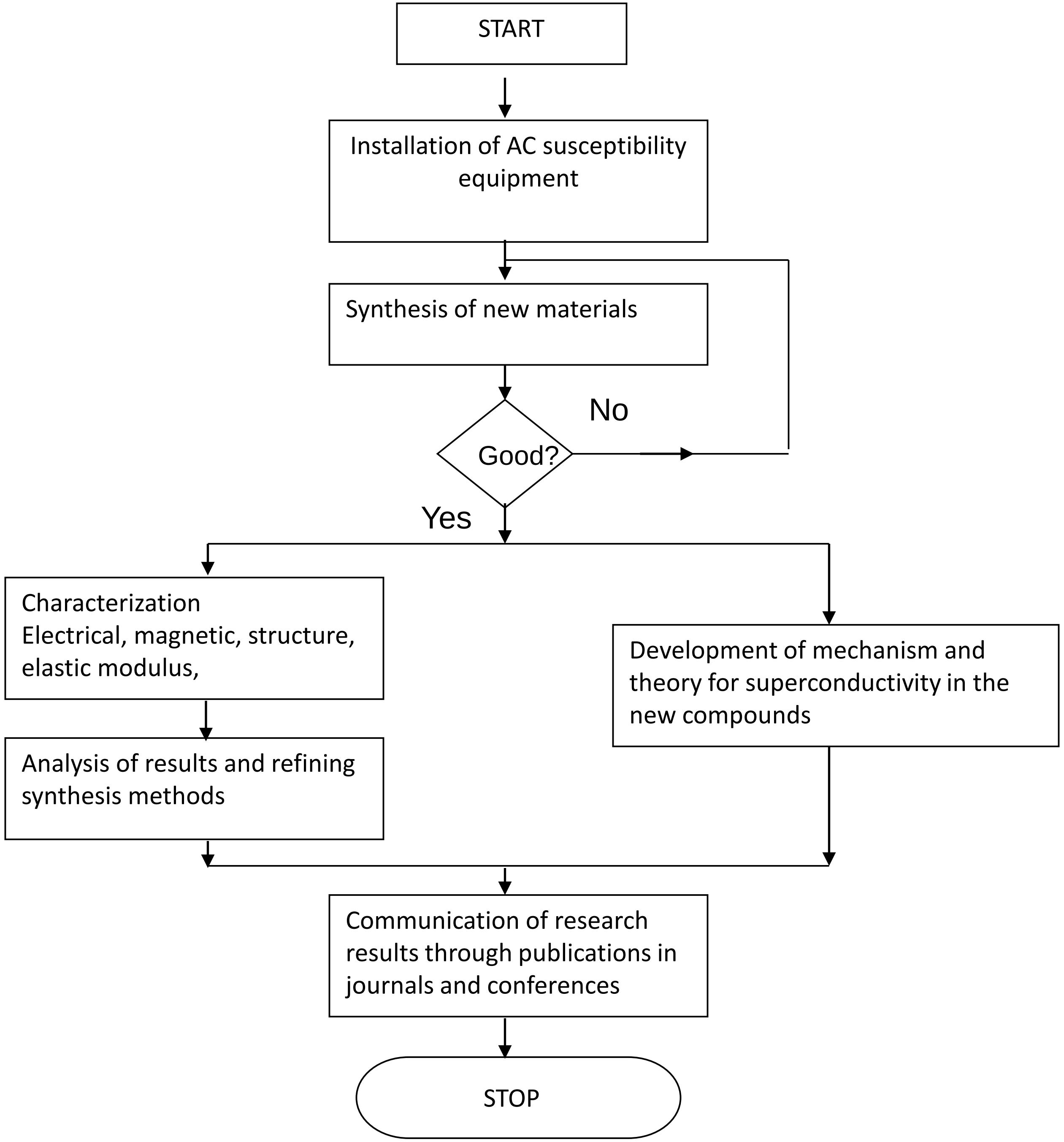

**Fig. 9 – SEM micrographs with 50.000× magnification.**

# Tampilan gambar

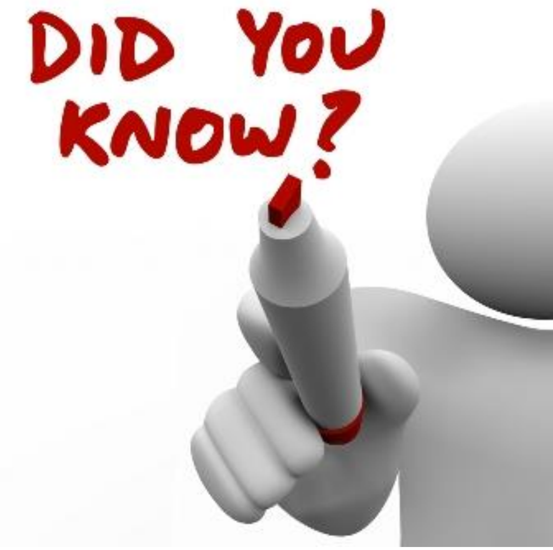
## Flowchart



# Structured Flowchart



# Clear, Concise and Accurate

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