

# NUR HIDAYAH BINTI AHMAD



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## ACADEMIC QUALIFICATION

### **Ph.D. (Physics)**

2012 – 2018

Universiti Malaysia Terengganu

### **M.Sc. (Energy Technology)**

2010 – 2012

Universiti Kebangsaan Malaysia

### **B.Sc. (Physics)**

2007 – 2010

Universiti Kebangsaan Malaysia

## SKILLS

### Language:

Malay and English

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## PROFESSIONAL SERVICES & MEMBERSHIPS

1. **Reviewer** of Journal of Engineering Science and Technology, JESTEC.
2. **Forum Panel** of *Hari Terbuka Pusat Pengajian Sains Asas*, UMT.
3. **Judge** of Inovasi Muslim for the 3<sup>rd</sup> Ihtifal Ulul Albab MRSM Se-Malaysia.
4. **Mentor** of Minggu Sains dan Matematik in SMK Kuala Telemung
5. **Member** of community project “Physics, The Force Awakens”, SMK Kompleks Mengabang Telipot
6. International Society for Carbohydrate Polymers Member (International)

### **AREA OF EXPERTISE**

General Physics, Solid State Ionics, Polymeric Materials, Conducting Polymer, Nano-polymer, Applied Sciences and Chemistry.

**SCOPUS ID:** Ahmad, Nur Hidayah Binti (AUTHOR ID: 56970467500), h-index: 3; 36 citations by 31 documents (updated until 22 March 2019);

**Research Gate ID:** Nur Hidayah Ahmad ;

**Google Scholar ID:** Nur Hidayah Binti Ahmad (N.H. Ahmad)

### **EVALUATION ACTIVITY**

#### **REVIEWER**

1. Mechanical Properties of Carboxymethyl Cellulose – Oleic Acid Solid Biopolymer Electrolyte. Journal of Engineering Science and Technology. Id: JESTEC (OT16-011) (2016).

### **WORKING EXPERIENCES**

1. **Tutor, Applied Science in Faculty Science and Technology at Open University Malaysia, Terengganu (May 2018 – to date)**

#### **Teaching (Level – Bachelor):**

- a. EBMM 2103 – Introduction to Manufacturing Process
- b. EBGB 4103 – Green Building
- c. EBIM 4103 – Maintainability of Facilities
- d. EBDM 2103 – Building Design Management
- e. EBIP 3103 – Industrial Engineering and Productivity Management
- f. EBML 2103 – Engineering Materials
- g. EBMP 2203 – Introduction to Manufacturing Systems

2. **Lecturer, Solar thermal in Diploma in Solar Energy Technology at College Technology and Innovation (KRIM), Terengganu, Malaysia (January – December 2014)**

#### **Teaching (Level – Diploma):**

- a. SST 2224 – Photovoltaic Solar Thermal (Credit hour: 4)
- b. DST 3124 – Photovoltaic Solar Thermal (Credit hour: 4)

3. **Physics Laboratory Demonstrator at Universiti Kebangsaan Malaysia, Selangor (September – December 2011)**

#### **Teaching (Level – Bachelor):**

- a. STSF 1812 – Physics Laboratory IA (Credit hour: 2)
- b. STSF 2812 – Physics Laboratory IIA (Credit hour: 2)

4. **Supervision (Final Year Project – Bachelor)**

- a. FIZ 4998 – Final Year Research Project (Credit hour: 3)
- b. FIZ 4999 – Final Year Research Project (Credit hour: 3)
- c. KIM 4998 – Final Year Research Project (Credit hour: 2)
- d. KIM 4999 – Final Year Research Project (Credit hour: 4)
- e. EBTP 4106 – Final Year Project

5. **Pasukan Latihan Pegawai Simpanan (PALAPES) under Angkatan Tentera Malaysia (ATM) at Universiti Kebangsaan Malaysia (2007 – 2010)**

- a. HHHZ 1002 – Palapes I (Credit hour: 2)
- b. HHHZ 2002 – Palapes II (Credit hour: 2)
- c. HHHZ 3002 – Palapes III (Credit hour: 2)

6. **Industrial Trainee at Pusat Sains Negara (PSN) - STSF 2882 (Credit hour: 2)**

**RESEARCH & CURRICULAR AWARDS**

NAME OF AWARDS	TITLE	AWARD AUTHORITY	AWARD LEVEL	YEAR
Research Award	Best Presenter	National Workshop on Functional Materials (NWFM) 2017	National	2017
Research Award	Second Winner	Three Minutes Thesis (3MT) 2017	University	2017
Curriculum Award	Young Officer	Yang Dipertua Raja Muda Perlis	National	2010

**PRODUCTS, INVENTION AND INNOVATION**

AWARDS	AWARD AUTHORITY	AWARD LEVEL	YEAR
Bronze Medalist	Novel Research and Innovation Competition (NRIC) 2016	International	2016
Silver Medalist	Innovation@UMT 2016	University	2016
Bronze Medalist	International Conference and Exposition on Inventions by Institutions of Higher learning (PECIPTA) 2015	International	2015
Silver Medalist	Innovation@UMT 2013	University	2013
Silver Medalist	Science & Technology Invention & Innovations Exhibition (SciTech) 2013	University	2013

**ARTICLES IN JOURNALS**

NO.	TITLE OF ARTICLE	AUTHOR	YEAR	JOURNAL NAME	VOL.	PAGES
1.	Characterization of unplasticized and propylene carbonate plasticized carboxymethyl cellulose doped ammonium chloride solid biopolymer electrolyte	<b>N.H. Ahmad &amp; M.I.N. Isa</b>	2016	Carbohydrate polymers ( <b>Scopus: Q1</b> )	137	426 - 432
2.	Ionic conductivity and electrical properties of carboxymethyl cellulose – NH <sub>4</sub> Cl solid polymer electrolytes	<b>N.H. Ahmad &amp; M.I.N. Isa</b>	2016	Journal of Engineering Science and Technology ( <b>Scopus: Q3</b> )	11	839 - 847
3.	Proton conducting solid polymer electrolytes based carboxymethyl cellulose doped ammonium chloride: ionic conductivity and transport studies	<b>N.H. Ahmad &amp; M.I.N. Isa</b>	2015	International Journal of Plastics Technology ( <b>Scopus: Q3</b> )	18	1 – 11

**CONFERENCE AND SEMINAR ATTENDED**

NO.	TITLE OF ARTICLE	AUTHOR	YEAR	CONFERENCE	LOCATION
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1.	Carboxymethyl cellulose – ammonium chloride on electrical of plasticized propylene carbonate solid bio-polymer electrolytes (SBPs) using experimental and computational studies	M.I.N. Isa, <b>N.H. Ahmad</b>	2017	International Conference in Phosphorus, Boron and Silicon (PBSi 2017)	Paris
2.	Structural and ionic conductivity studies on proton conducting solid biopolymer electrolyte based on 2Hydroxyethyl cellulose incorporated DTAB	<b>N.H. Ahmad</b> , N.Y. Bakar, M.I.N. Isa *Participant	2017	The 3 <sup>rd</sup> International Conference on Green Design and Manufacture 2017 (IConGDM2017)	Krabi, Thailand
3.	Ionic polymer studies on carboxymethyl cellulose-ammonium chloride solid biopolymer electrolyte plasticized with propylene carbonate	<b>N.H. Ahmad</b> & M.I.N. Isa *Presenter (Oral) & Participant	2017	National Workshop on Functional Materials (NWFM 2017)	University of Malaya, Kuala Lumpur
4.	Electrical effect of propylene carbonate as plasticizer for proton-conducting in solid bio-plastics based carboxymethyl cellulose-ammonium chloride electrolytes	<b>N.H. Ahmad</b> & M.I.N. Isa *Presenter (Oral) & Participant	2015	Postgraduate Colloquium (PCPPSA2015)	Universiti Malaysia Terengganu, Terengganu
5.	Conduction Mechanism of Solid Biopolymer Electrolytes System Based on Carboxymethyl cellulose – Ammonium chloride	<b>N.H. Ahmad</b> & M.I.N. Isa *Presenter (Oral) & Participant	2015	International Postgraduate Conference on Physics and Mathematical Sciences (IPCPMS2015)	Langkawi, Kedah
6.	Effect of adipic acid composition on structural and conductivity solid biopolymer electrolytes based on carboxy methylcellulose studies	M.I.H. Rozali, <b>N.H. Ahmad</b> & M.I.N. Isa *Presenter (Oral) & Participant	2015	International Postgraduate Conference on Physics and Mathematical Sciences (IPCPMS2015)	Langkawi, Kedah
7.	Proton Conducting Polymer Electrolytes of Carboxymethyl Cellulose doped Ammonium Chloride: Conductivity and Ionic Transport Studies	<b>N.H. Ahmad</b> & M.I.N. Isa *Presenter (Oral) & Participant	2014	Eastern Corridor Renewable Energy Symposium 2014 (ECRES2014)	Universiti Malaysia Terengganu, Terengganu
8.	Structural and ionic conductivity studies of cmc based polymerelectrolyte doped with NH <sub>4</sub> Cl	<b>N.H. Ahmad</b> & M.I.N. Isa *Presenter (Poster) & Participant	2013	27th Regional Conference on Solid State Science & Technology (RCSST27)	Kota Kinabalu, Sabah
9.	Proton Conducting Polymer Electrolytes of CMC + NH <sub>4</sub> Cl:	<b>N.H. Ahmad</b> & M.I.N. Isa	2013	12 <sup>th</sup> UMT Annual Symposium (UMTAS)	Kuala Terengganu,

Conductivity and Ionic Transport Studies	*Presenter (Oral) & Participant	2013)	Terengganu
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#### WORKSHOP ATTENDED

NO.	ORGANISER	PLACE	DATE	STATUS	TITLE
1.	Pusat Pengajian Sains Asas, Universiti Malaysia Terengganu	Dewan Seminar, Kompleks Kuliah Pusat, UMT	21 July 2016	Participant	Bengkel Penulisan Jurnal Berimpak
2.	Pusat Pengajian Sains Asas, Universiti Malaysia Terengganu	Medan Syarahan Timur & Makmal CAD, PPKK, UMT	31 October 2016	Participant	Bengkel Penaksiran Risiko Bahan Kimia Berbahaya kepada Kesihatan
3.	School of Food Science and Technology	School of Food Science and Technology, UMT	14 – 15 February 2015	Participant	Formatting Thesis / Dissertation using MS Word Facilities Workshop
4.	Pusat Pengajian Kejuruteraan Kelautan & Persatuan Pasca Siswazah PPKK	Bilik Seminar Aras 1, Bangunan FMSM, UMT	16 April 2015	Participant	Bengkel Penyeliaan Berkesan dan Penulisan Penerbitan Ilmiah Bagi Pelajar Pasca Siswazah PPKK
5.	Pusat Pengajian Sains Asas	Bilik Seminar Pusat Pengajian Sains Marin dan Sekitaran (PPSMS), UMT	5 – 6 Oktober 2015	Participant	Bengkel Kaedah Pencirian dan Analisis Data Pasca Siswazah PPSA
6.	Pusat Pengajian Sains Asas	Medan Kuliah 7, Pusat Pengajian Informatik dan Matematik Gunaan, UMT	29 – 30 September 2014	Participant	Bengkel Perisian Kuantum Mekanik-2014

#### ATTACHMENT PROGRAM

Organiser	Place	Date	Status	Title of Research	Sponsor
Prof. Ts. Dr. Mohd Ikmar Nizam Bin Hj. Mohamad Isa	Iniversity of Indonesia	2016	2013 - 2016	Advanced Material, Physics	n/a

#### RESEARCH PROJECT GRANT

PROJECT NO.	PROJECT TITLE	ROLE	YEAR	SOURCE OF FUND	STATUS
FRGS 59271	Electrical, Structural and Ionic Transport Study of Natural Polymer Based on Cellulose Doped with NH <sub>4</sub> Cl Proton Conducting Membrane Towards the Advancement of Green Materials	Member	2013 - 2016	Ministry of Education Malaysia (MOE)	Completed

#### ACADEMIC REFEREES

1. Prof. Ts. Dr. Mohd Ikmar Nizam Bin Hj. Mohamad Isa (M.I.N. Isa)

P. Tech (Material Tech.), F.I.S.C.A. (Fellow); M.A.S.S. (Life); I.M.M.; S.P.I.E.  
Lecturer,  
Faculty of Science & Technology,  
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Negeri Sembilan Darul Khusus, Malaysia.  
Tel No : +06 7978740  
([ikmar\\_isa@usim.edu.my](mailto:ikmar_isa@usim.edu.my) / [ikmarnizam@gmail.com](mailto:ikmarnizam@gmail.com))

**2. Dr. Nor Hazmin Binti Sabri**

Pensyarah  
Universiti Malaysia Terengganu,  
21030 Kuala Nerus, Terengganu, Malaysia.  
Tel No : 09 6684866 / 09 6683407  
([norhazmin@umt.edu.my](mailto:norhazmin@umt.edu.my))

**3. Dr. Zalita Binti Zainuddin**

Pusat Sains Terhadapan,  
Fakulti Sains dan Teknologi,  
Universiti Kebangsaan Malaysia,  
43600 UKM Bangi, Selangor.  
Tel No : 03 89213611  
([zazai@ukm.edu.my](mailto:zazai@ukm.edu.my))

**DECLARATION**

Hereby declare that all the details furnished above are true to the best of my knowledge and belief.

**NUR HIDAYAH BINTI AHMAD (N.H. AHMAD)**

Date: JANUARY 2020

**ATTACHMENT**

## **Dissertation Title for Doctorate**

### **TITLE (DOCTORATE):**

Structural, Thermal and Electrical Characterization of Carboxymethyl cellulose – Ammonium chloride Based Solid Biopolymer Electrolytes for Use in Rechargeable Protonic Cell

### **ABSTRACT (DOCTORATE):**

Two solid biopolymer electrolyte (SBE) systems of carboxymethyl cellulose doped ammonium chloride (CMC-AC) and plasticized with propylene carbonate (CMC-AC-PC) have been successfully prepared by solution casting technique. Both SBE systems were translucent, free-standing and flexible with no phase separation. In this research, two different IR methods; Gaussian 09W software as computational and Fourier Transform Infrared (FTIR) as experimental, were used to identify the complexation between polymer, salt and plasticizer. Gaussian 09W analysis reveals the complexation occurred between CMC and AC at  $1412\text{cm}^{-1}$  and  $1585\text{cm}^{-1}$ . No significant complexation is observed with the addition of PC, hence, PC has created new pathway and acted as lubricant in the SBEs. X-Ray Diffraction (XRD) analysis showed the amorphous pattern for both systems. With the addition of PC, XRD analysis showed that PC had increased the amorphousness of the SBEs. Thermal analysis by Differential Scanning Calorimetry (DSC) showed decrease in the value of glass transition temperature,  $T_g$  with addition of salt / plasticizer concentration helps in increasing the ionic conductivity by the ease movement of the polymer chains. The electrical properties of SBEs were investigated using Electrical Impedance Spectroscopy (EIS). The highest conducting CMC-AC SBE was achieved at  $(1.43 \pm 0.02) \times 10^{-3} \text{ S/cm}$  with addition of 16 wt.% AC and improved to  $(1.01 \pm 0.03) \times 10^{-2} \text{ S/cm}$  when plasticized with 8 wt.% of PC. The temperature-conductivity of SBEs were observed to obey the Arrhenius rule ( $R^2 \sim 1$ ) and it is a thermally activated process. The ionic transport properties were determined via FTIR deconvolution method. It shows that the ionic conductivity results for both SBE systems were predominantly controlled by the number density ( $n$ ), mobility ( $\mu$ ) and diffusion coefficient ( $D$ ) of ions. By performing the Transference Number Measurement (TNM), the charge transport in these SBE systems is predominantly ions and the conducting species were identified as cation or protons ( $\text{H}^+$ ) which confirmed the FTIR analysis. The conduction mechanisms for both SBE systems can be represented by the Quantum Mechanical Tunnelling (QMT) model. The rechargeable protonic cell (RPC) was assembled using both systems with the configuration  $\text{Zn} + \text{ZnSO}_4 \cdot 7\text{H}_2\text{O} // \text{the highest conducting SBE} // \text{MnO}_2$  and showed promising performance at room temperature. This work implies that there is potential and possible practical application of the present SBE as a new invention of bio-based electrolytes system in the fabrication of electrochemical devices.

**Please state specifically the fields you are interested in teaching**

~~Physics (solid state ionics, polymeric materials, conducting polymer, nano-polymer and applied sciences),~~

Chemistry, Project management (green building, maintainability of facilities, manufacturing processes, Total productive maintenance), Research methodology (quantitative / qualitative)



