

# Anis Allagui, Ph.D

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## IDENTIFYING INFORMATION

### Employment History

- 2020 – Present **Courtesy Associate Professor**, *Dept. of Mechanical and Materials Engineering, Florida International University*, Miami, United States.
- 2019 – Present **Associate Professor**, *Dept. of Sustainable & Renewable Energy Engineering, University of Sharjah*, Sharjah, United Arab Emirates.  
Affiliated faculty, Center for Advanced Materials Research, Research Institute of Sciences and Engineering
- 2013 – 2019 **Assistant Professor**, *Dept. of Sustainable & Renewable Energy Engineering, University of Sharjah*, Sharjah, United Arab Emirates.
- Summer 2018 **Visiting Researcher**, *Materials Science & Engineering, North Carolina State University*, Raleigh, NC, United States.
- Summer 2015 **Visiting Researcher**, *Dept. of Chemical and Biological Engineering, University of Ottawa*, Ottawa, Canada.
- 2011 – 2013 **Postdoctoral Fellow / Fonds de recherche du Québec – Nature et technologies (FQRNT)**, *Dept. of Chemical and Biological Engineering, University of Ottawa*, Ottawa, Canada.

### Education

- 2011 **Ph.D in Mechanical Engineering**, *Concordia University*, Montreal, Canada.  
Dissertation On the Electrochemical Discharges for Nanoparticles Synthesis  
Advisor Prof. Rolf Wüthrich
- 2007 **Masters in Engineering Mechanics**, *Ecole Polytechnique de l'Université de Nantes*, Nantes, France.  
Dissertation Heating of electrical resistances on polycrystalline Si substrates.  
Advisor Prof. Yves Scudeller

### Research Interests

**Electrochemical energy storage:** electric double layer capacitors and hybrid pseudocapacitors, fractional capacitors, impedance spectroscopy, (time-domain and frequency-domain) fractional-order analysis, effective capacitance, energy and power, ac line filtering, memory effect, oscillators.

**Plasma micro-discharges:** synthesis of metallic/bimetallic nanomaterials, metal oxides and nitrides, graphene and other carbon derivatives; degradation of organic and inorganic compounds in liquid media, nonlinear dynamics of current and optical emissions time series, high-speed random bit generation; current and voltage breakdown.

**Electrocatalysis:** non-platinum group nanomaterials, materials electrochemistry, ammonia electrooxidation reaction, formic acid electrooxidation, methanol electrooxidation for direct method fuel cell, hydrogen evolution reaction; electrochemical sensors.

### ***Professional Development***

- 2017 **Institute of Leadership in Higher Education**, [University of Sharjah](#), Sharjah, UAE.
- Participated in a training workshop on writing effective course learning outcomes.
- 2015 **Sharjah's 1<sup>st</sup> Workshop on Computational Science and Engineering**, [University of Sharjah](#), Sharjah, UAE.
- Examined first-principles calculations of the electronic band structure of condensed matter systems using Quantum Espresso
  - Carried out examples of calculation using Quantum Espresso;
- 2012 **Foundations of Project Management**, [Mitacs](#), Ottawa, Canada.
- Reviewed the principles of project management;
  - Learned about and worked with different personalities to improve the team processes and collaboration;
  - Applied the basics of planning and used critical path method (CPM) for scheduling the different sets of project activities;
  - Used risk analysis tools and monitoring of project progress.
- 2009 **Centre for Teaching & Learning Services**, [Concordia University](#), Montreal, Canada.
- Examined various approaches to teaching and issues in higher education (learning process, teaching with technology, etc.);
  - Planned a mini lesson and practiced different teaching strategies;
  - Developed a course syllabus for *Introduction to Nonequilibrium Thermodynamics*;
  - Articulated my teaching philosophy statement.

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### **HONORS AND AWARDS**

- 2016 The [University of Sharjah](#) Annual Incentive Award for Distinguished Faculty Members in Scientific Research.
- 2013 Presidential Award for Best Thesis by the Ministry of Higher Education and Scientific Research in Tunisia.
- 2008 – 2010 [University Mission of Tunisia in North America](#) Award, Montreal, Canada.
- 2008 – 2009 [Concordia University](#) Teaching Fellowship, Montreal, Canada.
- 2009 [Concordia University](#) Multiphysics Workshop Award, Montreal, Canada.  
*Best selected paper award in non-linear dynamics.*
- 2009 [Concordia University](#) Graduate Seminar in University Teaching Certificate, Montreal, Canada.

- 2008 Microsystems and Nanoelectronics Research Conference ([MNRC](#)), Ottawa, Canada.  
*Silver Leaf Certificate for Best Article.*
- 2008 [Concordia University](#) Conference Award Competition for Graduate Students and Postdoctoral Fellows, Montreal, Canada.

## RESEARCH AND SCHOLARSHIP

### *Grants and Contracts*

- 2020 – 2020 A. S. Elwakil, A. Allagui, and S. Majzoub  
*Fast Fourier Transform Spectral Impedance Measurement using Structured Broadband Gaussian Noise Excitation.*  
Spotlight Project, College of Engineering, University of Sharjah  
Sharjah, United Arab Emirates.  
**AED 40000 (≈ US\$ 11000)**
- 2019 – 2021 A. S. Elwakil, H. Alawadhi, and A. Allagui (co-PI)  
*True Physical Random Number Generator using Plasma Micro Discharges for Encryption Applications.*  
Dubai Electronic Security Center (DESC) Innovation Research Grant  
Dubai, United Arab Emirates.  
**AED 350000 (≈ US\$ 100000)**
- 2019 – 2021 M. A. Abdelkareem, A. Allagui (co-PI), D. Zhang, A. Inayat, and H. Alawadhi  
*Development of Photo-electrochemical Fuel Cells for Simultaneous Wastewater Treatment and Power Generation.*  
College of Graduate Studies and Research – Summer Research Grant No. 18020406122  
University of Sharjah, Sharjah, United Arab Emirates.  
**AED 80000 (≈ US\$ 21700)**
- 2018 A. Allagui (PI)  
*The Effect of Ionophobic Nanopores on the Performance Metrics of Electric Double-Layer Capacitors.*  
College of Graduate Studies and Research – Summer Research Grant No. SR827/2018  
University of Sharjah, Sharjah, United Arab Emirates.  
**AED 15000 (≈ US\$ 4500)**
- 2016 – 2018 A. Allagui (PI), A. S. Elwakil, and H. Alawadhi  
*On the Chaotic Behavior of Electric and Spectral Emission Responses of Contact Glow Discharge Electrolysis.*  
College of Graduate Studies and Research – Grant for Competitive Research Project No. 1602040653-P  
University of Sharjah, Sharjah, United Arab Emirates.  
**AED 80000 (≈ US\$ 21750)**

- 2016 – 2018 A. Allagui (PI), A. S. Elwakil, M. A. Abdelkareem, and H. Alawadhi  
*Reduced Graphene Oxide-based Double Layer Capacitor for Alternating Current Line Filtering Application.*  
 College of Graduate Studies and Research – Grant for Competitive Research Project No. 1602040634-P  
 University of Sharjah, Sharjah, United Arab Emirates.  
**AED 160000 (≈ US\$ 43500)**
- 2016 – 2018 M. Kaidi, H. Alawadhi, K. Daoudi, and A. Allagui (co-PI)  
*Novel Metal Oxide/Amorphous Composite Coatings for Enhancing Silicon Solar Cells Photoconversion and for High Sensitivity Gas Sensors.*  
 College of Graduate Studies and Research – Grant for Targeted Research Project No. 1602143028-P  
 University of Sharjah, Sharjah, United Arab Emirates.  
**AED 80000 (≈ US\$ 21700)**
- 2015 – 2016 A. Alalami, A. Allagui (co-PI), and H. Alawadhi  
*Microstructural, Optical and Thermal Investigation of Copper Oxide Nano-Materials as Selective Absorbers for Solar Collectors Applications.*  
 College of Graduate Studies and Research – Grant for Collaborative Research Projects  
 University of Sharjah, Sharjah, United Arab Emirates.  
**AED 144000 (≈ US\$ 40000)**
- 2015 A. Allagui (PI)  
*Synthesis of Graphene Microflakes by Electrochemical Exfoliation for Energy Storage Applications: Conventional Electrolysis vs Plasma Micro-discharges.*  
 College of Graduate Studies and Research – Summer Research Grant  
 University of Sharjah, Sharjah, United Arab Emirates.  
**AED 8000 (≈ US\$ 2200)**
- 2014 – 2015 H. Alawadhi and A. Allagui (co-PI)  
*Synthesis and Characterization of Nickel Oxides/Hydroxides Nanoparticles by Contact Glow Discharge Electrolysis for Supercapacitors Applications.*  
 College of Graduate Studies and Research – Grant for Collaborative Research Projects  
 University of Sharjah, Sharjah, United Arab Emirates.  
**AED 100000 (≈ US\$ 30000)**
- 2014 A. Allagui (PI)  
*Plasma Micro-discharges in Aqueous Solutions: A Novel Technique for Hydrogen Production from the Degradation of Ammonia.*  
 College of Graduate Studies and Research – Seed Grant  
 University of Sharjah, Sharjah, United Arab Emirates.  
**AED 20000 (≈ US\$ 6000)**
- 2011 – 2013 A. Allagui (PI)  
 Heterogeneous Electrocatalysts by Plasma Micro-discharges  
 Le Fonds québécois de la recherche sur la nature et les technologies (FQRNT) Postdoctoral fellowship, Canada.  
**CA\$ 64000 (≈ US\$ 64000)**

## **Publications**

### **Patents**

3. Bipolar Exfoliation and In-Situ Deposition of High-Quality Reduced Graphene, US Patent 63/037,197
2. Bipolar Exfoliation and Deposition of Phosphorene Onto Negative Feeding Electrode, US Patent 17/015,235. 2021
1. A. Elwakil, A. Allagui, S. Majzoub, and H. Alawadhi. Atmospheric Pressure Air Microplasma System for True Random Bit Generation, US Patent #10,922,056. 2021

### **Peer-reviewed Journal Articles**

71. I. Khakpour, A. R. Baboukani, A. Allagui, A. Hachicha, and C. Wang. On the mechanistic pathways of exfoliation-and-deposition of graphene by bipolar electrochemistry. *Nanotechnol.*, 2021
70. A. Allagui, A. S. Elwakil, and H. Eleuch. Highlighting a common confusion in the computation of capacitance of electrochemical energy storage devices. *J. Phys. Chem. C*, 125:9591–9592, 2021
69. A. Allagui, A. S. Elwakil, and M. E. Fouda. Revisiting the time-domain and frequency-domain definitions of capacitance. *IEEE Trans. Electron Devices*, 68(6), 2021
68. A. Allagui, A. S. Elwakil, and C. Psychalinos. Decoupling the magnitude and phase in a constant phase element. *J. Electroanal. Chem.*, 888:115153, 2021
67. A. Elwakil, A. Allagui, and C. Psychalinos. On the equivalent impedance of self-similar ladder networks. *IEEE Trans. Circuits Syst. II Express Briefs*, 10.1109/TC-SII.2021.3057961, 2021
66. A. Allagui, S. Majzoub, A.S. Elwakil, A.E. Rojas, and H. Alawadhi. Atmospheric pressure air microplasma current time series for true random bit generation. *Sci. Rep.*, 10(20971):1–10, 2020
65. A. Allagui, A. S. Elwakil, A. E. Rojas, S. Majzoub, and H. Alawadhi. Parallel random bitstreams from a single source of entropy based on nonthermal electrochemical microplasma. *Plasma Processes Polym.*, 17(12):2000123, 2020
64. D. Zhang, A. Allagui, A. S. Elwakil, Z. Yan, and H. Lu. Active circuit model of low-frequency behavior in perovskite solar cells. *Org. Electron.*, 85:105804, 2020
63. S. Majzoub, A. Allagui, and A. S. Elwakil. Fast spectral impedance measurement method using a structured random excitation. *IEEE Sensors J.*, 20(15):8637 – 8642, 2020
62. K. Daoudi, M. Gaidi, S. Columbus, D. Zhang, A. Allagui, M. Shameer, A. Taieb, and H. Alawadhi. Structural effects of silver-nanoprism-decorated si nanowires on surface-enhanced raman scattering. *Nanotechnol.*, 31:255706, 2020
61. M. E. Fouda, A. Allagui, A. S. Elwakil, S. Das, C. Psychalinos, and A. G. Radwan. Nonlinear charge-voltage relationship in constant phase element. *AEU Int. J. Electron. Commun.*, 117(1533104), 2020
60. A. Allagui, H. Alnaqbi, A. S. Elwakil, Z. Said, A. Hachicha, C. Wang, and M. A. Abdelkareem. Fractional-order electric double-layer capacitors with tunable low-frequency impedance phase angle and energy storage capabilities. *Appl. Phys. Lett.*, 116:013902, 2020

59. A. Allagui, M. Fouda, and A. S. Elwakil. The ragone plot of supercapacitors under different loading conditions. *J. Electrochem. Soc.*, 167(2):020533, 2020
58. M. Fouda, A. S. Elwakil, and A. Allagui. Commercial supercapacitor parameter estimation from step voltage excitation. *Int. J. Circuit Theory Appl.*, 10.1002/cta.2680, 2019
57. A. Allagui, D. Zhang, I. Khakpour, A. S. Elwakil, and C. Wang. Quantification of memory in fractional-order capacitors. *J. Phys. D*, 53(02LT03), 2020
56. A. R. Baboukani, I. Khakpour, V. Drozd, A. Allagui, and C. Wang. Single-step exfoliation of black phosphorus and deposition of phosphorene via bipolar electrochemistry for capacitive energy storage application. *J. Mater. Chem. A*, 7(25548-25556), 2019
55. M. E. Fouda, A. Allagui, A. S. Elwakil, A. Eltawil, and F. Kurdahi. Supercapacitor discharge under constant resistance, constant current and constant power loads. *J. Power Sources*, 435:226829, 2019
54. M. A. Abdelkareem, A. Allagui, Z. Said, A. S. Elwakil, R. Zannern, W. H. Tanveer, and K. Elsaid. Frequency-dependent effective capacitance of supercapacitors using electrospun cobalt-carbon composite nanofibers. *J. Electrochem. Soc.*, 166(12):A2403–A2408, 2019
53. M. E. Fouda, A. S. Elwakil, A. Allagui, H. Rezk, and A. M. Nassef. Convolution-based estimation of supercapacitor parameters under periodic voltage excitations. *J. Electrochem. Soc.*, 166(10):A2267–A2269, 2019
52. I. Khakpour, A. R. Baboukani, A. Allagui, and C. Wang. Bipolar exfoliation and in-situ deposition of high-quality graphene for supercapacitor application. *ACS Appl. Energy Mater.*, 2(7):4813–4820, 2019
51. D. Zhang, A. Allagui, A. S. Elwakil, A. M. Nassef, H. Rezk, J. Cheng, and W. C.H. Choy. On the modeling of dispersive transient photocurrent response of organic solar cells. *Org. Electron.*, 70:42–47, 2019
50. Z. Said, A. Allagui, M. A. Abdelkareem, A. S. Elwakil, H. Alawadhi, R. Zannerni, and K. Elsaid. Modulating the energy storage of supercapacitors by mixing close-to-ideal and far-from-ideal capacitive carbon nanofibers. *Electrochim. Acta*, 301(465-471), 2019
49. E. Sayed, T. Eisa, M. A. Abdelkareem, H. Mohamed, A. Allagui, H. Alawadhi, and KJ Chae. Direct urea fuel cells: Challenges and opportunities. *J. Power Sources*, 417:159–175, 2019
48. M. A. Abdelkareem, W. H. Tanveer, E. T. Sayed, M. El haj Assad, A. Allagui, and S. W. Cha. On the technical challenges affecting the performance of direct internal reforming biogas solid oxide fuel cells. *Renewable Sustainable Energy Rev.*, 101(361-375), 2019
47. M. A. Abdelkareem, A. Allagui, E. Sayed, M. Assad, Z. Said, and K. Elsaid. Comparative analysis of liquid versus vapor-feed passive direct methanol fuel cells. *Renew. Energy*, 131:563–584, 2019
46. A. Allagui, D. Zhang, and A. S. Elwakil. Short-term memory in electric double-layer capacitors. *Appl. Phys. Lett.*, 113:253901–5, 2018
45. A. Allagui, A. S. Elwakil, Z. Said, M. A. Abdelkareem, and D. Zhang. Band-pass filter and relaxation oscillator using electric double-layer capacitor. *ChemElectroChem*, 5(3793-3798), 2018

44. A. Allagui, T. J. Freeborn, A. S. Elwakil, M. E. Fouda, B. J. Maundy, A. G. Radwan, Z. Said, and M. A. Abdelkareem. Review of fractional-order electrical characterization of supercapacitors. *J. Power Sources*, 400(457–467), 2018
43. A. E. Rojas, A. Allagui, A. S. Elwakil, and H. Alawadhi. True random bit generators based on current time series of contact glow discharge electrolysis. *J. Appl. Phys.*, 123(20):203301, 2018
42. A. Allagui, A. S. Elwakil, M. Fouda, and A. G. Radwan. Capacitive behavior and stored energy in supercapacitors at power line frequencies. *J. Power Sources*, 390:142–147, 2018
41. Z. Said, A. Allagui, M. A. Abdelkareem, H. Alawadhi, and K. Elsaid. Acid-functionalized carbon nanobers for high stability, thermoelectrical and electrochemical properties of nanofluids. *J. Colloid Interface Sci.*, 520:50–57, 2018
40. C. Psychalinos, A. S. Elwakil, A. Allagui, and A. Tepljakov. Special issue on recent advances in the design and applications of fractional-order circuits and systems. *AEU Int. J. Electron. Commun.*, 81:132 – 135, 2017
39. A. Allagui, A. S. Elwakil, and T. J. Freeborn. Supercapacitor reciprocity and response to linear current and voltage ramps. *Electrochim. Acta*, 258:1081–1085, 2017
38. A. Allagui, Z. Said, M. A. Abdelkareem, A. S. Elwakil, M. Yang, and H. Alawadhi. DC and AC performance of graphite films supercapacitors prepared by contact glow discharge electrolysis. *J. Electrochem. Soc.*, 164(12):A2539–A2546, 2017
37. A. S. Elwakil, A. Allagui, T.J. Freeborn, and B.J. Maundy. Further experimental evidence of the fractional-order energy equation in supercapacitors. *AEU Int. J. Electron. Commun.*, 78:209 – 212, 2017
36. A. Allagui, J. M. Ashrafa, M. Khalila, M. A. Abdelkareem, A. S. Elwakil, and H. Alawadhi. All-solid-state double-layer capacitors using binderless reduced graphene oxide thin films prepared by bipolar electrochemistry. *ChemElectroChem*, 4:2084–2090, 2017
35. A. S. Elwakil, A. Agambayev, A. Allagui, and K. N. Salama. Experimental demonstration of fractional-order oscillators of orders 2.6 and 2.7. *Chaos, Solitons Fractals*, 96:160–164, 2017
34. A.S. Elwakil, A. Radwan, T. Freeborn, A. Allagui, B.J. Maundy, and M. Fouda. Low-voltage commercial super-capacitor response to periodic linear-with-time current excitation: A case study. *IET Circuits, Devices & Systems*, 11(3):189–195, 2017
33. S. Ntais, A. Serov, N. I. Andersen, A. J. Roy, A. Allagui, Zhen Lu, X. Cui, E. A. Baranova, and P. Atanassov. Promotion of ammonia electrooxidation on Pt nanoparticles by nickel oxide support. *Electrochim. Acta*, 222:1455–1463, 2016
32. A. Allagui, T. J. Freeborn, A. S. Elwakil, and B. J. Maundy. Reevaluation of performance of electric double-layer capacitors from constant-current charge/discharge and cyclic voltammetry. *Sci. Rep.*, 6(38568), 2016
31. A. Allagui, A. S. Elwakil, B. J. Maundy, and T. J. Freeborn. Spectral capacitance of series and parallel combinations of supercapacitors. *ChemElectroChem*, 3(9):1429–1436, 2016
30. M. A. Abdelkareem, A. Allagui, T. Tsujiguchi, and N. Nakagawa. Effect of the ratio carbon nanofiber/carbon black in the anodic microporous layer on the performance of passive direct methanol fuel cell. *J. Electrochem. Soc.*, 163(9):F1–F6, 2016



29. M. E. Fouda, A. S. Elwakil, A. G. Radwan, and A. Allagui. Power and energy analysis of fractional-order electrical energy storage devices. *Energy*, 111:785–792, 2016
28. A. Allagui, A. E. Rojas, T. Bonny, A. S. Elwakil, and M. A. Abdelkareem. Nonlinear time-series analysis of current signal in cathodic contact glow discharge electrolysis. *J. Appl. Phys.*, 119:203303, 2016
27. A. S. Elwakil, A. Allagui, B. J. Maundy, and C. Psychalinos. A low frequency oscillator using a super-capacitor. *AEU Int. J. Electron. Commun.*, 70(7):970–973, 2016
26. A. Allagui, M. A. Abdelkareem, H. Alawadhi, and A. S. Elwakil. Reduced graphene oxide thin film on conductive substrates by bipolar electrochemistry. *Sci. Rep.*, 6(21282), 2016
25. C. Psychalinos, A. S. Elwakil, B.J. Maundy, and A. Allagui. Analysis and realization of a switched fractional-order-capacitor integrator. *Int. J. Circuit Theory Appl.*, 44(11):2035–2040, 2016
24. N. Janene, A. Allagui, H. Alawadhi, M. A. El Khakani, B. Bessais, and M. Gaidi. Opto-electronic properties of TiO<sub>2</sub>/PS/mc-Si heterojunction based solar cell. *Appl. Surf. Sci.*, 368:140–145, 2016
23. A. Allagui, H. Alawadhi, M. M. Alkaaby, M. Gaidi, K. Mostafa, and Y. Abdulaziz. Mott-schottky analysis of flower-like ZnO microstructures with constant phase element behavior. *Phys. Status Solidi A*, 213(1):139–145, 2016
22. B. J. Maundy, A. S. Elwakil, and A. Allagui. Extracting the parameters of the single-dispersion cole bioimpedance model using a magnitude-only method. *Comput. Electron. Agric.*, 119:153–157, 2015
21. G. Tsirimokou, C. Psychalinos, A. Allagui, and A.S. Elwakil. Simple non-impedance-based measuring technique for supercapacitors. *Electron. Lett.*, 51(21):1699–1701, 2015
20. A. Allagui, T. Salameh, and H. Alawadhi. One-pot synthesis of composite NiO nanomaterials/graphitic carbon flakes with contact glow discharge electrolysis for electrochemical supercapacitors. *Int. J. Energy Res.*, 39:1689–1697, 2015
19. A. Allagui and R. Wüthrich. Nonequilibrium thermodynamics for the stability study of contact glow discharge electrolysis. *Plasma Processes Polym.*, 12(7):691–697, 2015
18. A. Allagui, T. Salameh, and H. Alawadhi. Dendritic CuO structures synthesized by bipolar electrochemical process for electrochemical energy storage. *J. Electroanal. Chem.*, 750:107–113, 2015
17. A. Allagui and A. Elwakil. On the N-shaped conductance and hysteretic behavior of contact glow discharge electrolysis. *Electrochim. Acta*, 168:173–177, 2015
16. A. Allagui, N. Brazeau, H. Alawadhi, F. Almomani, and E. A. Baranova. Cathodic contact glow discharge electrolysis for the degradation of liquid ammonia solutions. *Plasma Processes Polym.*, 12(1):25–31, 2015
15. A. H. Alami, A. Allagui, and H. Alawadhi. Synthesis and optical properties of electrodeposited crystalline Cu<sub>2</sub>O in the Vis–NIR range for solar selective absorbers. *Renew. Energy*, 82:21–25, 2015
14. A. H. Alami, A. Allagui, and H. Alawadhi. Microstructural and optical studies of CuO thin films prepared by chemical ageing of copper substrate in alkaline ammonia solution. *J. Alloys Compd.*, 617:542–546, 2014



13. A. Allagui, A. H. Alami, E. A. Baranova, and R. Wüthrich. Size-dependent capacitance of nickel oxide nanoparticles synthesized with contact glow discharge electrolysis. *J. Power Sources*, 262:178–182, 2014
12. L. Assaud, E. Monyoncho, K. Pitzschel, A. Allagui, M. Hanbücken, E. A. Baranova, and L. Santinacci. 3D-nanoarchitected Pd/Ni catalysts prepared by atomic layer deposition for formic acid electrooxidation. *Beilstein J. Nanotechnol.*, 5:162–172, 2014
11. A. H. Alami and A. Allagui. Design and analysis of a compact solar-driven constant-torque reaction steam turbine. *Energy Convers. Manage.*, 79:456–460, 2014
10. A. Allagui, S. Sarfraz, B. Middleton, F. Almomani, and E. A. Baranova. Electrochemical behaviour of ammonia on Ni<sub>98</sub>Pd<sub>2</sub> nano-structured catalyst. *Int. J. Hydrogen Energy*, 39(1):41–48, 2014
9. A. Allagui, S. Sarfraz, and E. A. Baranova. Ni<sub>x</sub>Pd<sub>1-x</sub> (x = 0.98, 0.93, 0.58) nanostructured catalysts for ammonia electrooxidation in alkaline media. *Electrochim. Acta*, 110:253–259, 2013
8. A. Allagui, E. A. Baranova, and R. Wüthrich. Synthesis of Ni and Pt nanomaterials by cathodic contact glow discharge electrolysis in acidic and alkaline media. *Electrochim. Acta*, 93(0):137–142, 2013
7. E. A. Baranova, A. Cally, A. Allagui, S. Ntais, and R. Wüthrich. Nickel particles with increased catalytic activity towards hydrogen evolution reaction. *C.R. Chim.*, 16(1):28–33, 2013
6. A. Allagui, M. Oudah, X. Tuaeov, S. Ntais, F. Almomani, and E. A. Baranova. Ammonia electro-oxidation on alloyed PtIr nanoparticles of well-defined size. *Int. J. Hydrogen Energy*, 38(5):2455–2463, 2013
5. A. Allagui, S. Sarfraz, B. Middleton, F. Almomani, and E. A. Baranova. Ammonia electrooxidation in alkaline media on NiPd nanoparticles: Effect of pH and concentration. *ECS Trans.*, 50(2):1897 – 1906, 2013
4. A. Allagui and R. Wüthrich. The electrochemical discharges for the synthesis of nickel oxide nanoparticles: Characterization and mechanism. *Electrochim. Acta*, 58(0):12 – 18, 2011
3. R. Wüthrich and A. Allagui. Building micro and nanosystems with electrochemical discharges. *Electrochim. Acta*, 55(27):8189–8196, 2010
2. M. Mousa, A. Allagui, H. D. Ng, and R. Wüthrich. The effect of thermal conductivity of the tool electrode in spark-assisted chemical engraving gravity-feed micro-drilling. *J. Micromech. Microeng.*, 19(1):015010, 2009
1. A. Allagui and R. Wüthrich. Gas film formation time and gas film life time during electrochemical discharge phenomenon. *Electrochim. Acta*, 54(23):5336–5343, 2009

## Books/Monographs

1. R. Wüthrich and A. Allagui. *Electrolysis in aqueous solutions under extreme current densities – fundamentals and applications of electrochemical discharge phenomenon*. Nova Science Publishers Inc., 2010

## Book Chapters

2. D. Zhang and A. Allagui. *Design and performance optimization of renewable energy systems*, chapter Photovoltaic Cells and Systems. Number 8. Elsevier, 2020
1. R. Wüthrich and A. Allagui. *Electrolysis: Theory, Types and Applications*, chapter 5. Nova Science Publishers Inc., 2010

## In Collections

1. HongGuang Sun, Yong Zhang, Dumitru Baleanu, Wen Chen, and YangQuan Chen. A new collection of real world applications of fractional calculus in science and engineering. *Commun. Nonlinear Sci. Numer. Simul.*, 64:213 – 231, 2018. (Section 10.2)

## Papers/Abstracts in Refereed Conference Proceedings (Selected from Past 5 Years)

7. I. Khakpour, A. Rabiei Baboukani, A. Allagui, and C. Wang. Contribution of different exfoliation mechanisms in the bipolar electrochemical fabrication of graphene. In *PRiME 2020 (ECS, ECSJ, & KECS Joint Meeting)*, 2020
6. T. Freeborn, A.S. Elwakil, and A. Allagui. Supercapacitor fractional-order model discharging from polynomial time-varying currents. In *2018 International Symposium on Circuits and Systems*, pages 1–5, 2018
5. T. J. Freeborn, A. Allagui, and A. Elwakil. Modelling supercapacitors leakage behaviour using a fractional-order model. In *2017 European Conference on Circuit Theory and Design (ECCTD)*, pages 1–4, Sept 2017
4. A. Allagui, Z. Said, M. A. Abdelkareem, A. S. Elwakil, M. Yang, and H. Alawadhi. Dc energy storage and ac line filtering of graphene micro-sheets prepared with plasma micro-discharges. In *International Conference on Advances in Functional Materials, University of California, Los Angeles Campus, USA, Aug. 2017*
3. B.J. Maundy, A.S. Elwakil, T.J. Freeborn, and A. Allagui. Determination of supercapacitor metrics using a magnitude-only method. In *2016 IEEE International Symposium on Circuits and Systems (ISCAS)*, pages 1186–1189, May 2016
2. B. J. Maundy, A. Elwakil, T. Freeborn, and A. Allagui. Improved method to determine supercapacitor metrics from highpass filter response. In *28th International Conference on Microelectronics (ICM)*, pages 25–28, Dec 2016
1. K. T. Ahmed, A. Merabet, R. Beguenane, H. Ibrahim, and A. Allagui. Real-time platform for controlling dc microgrid based standalone solar energy conversion system. In *2016 International Conference on Industrial Informatics and Computer Systems (CI-ICS)*, pages 1–5, March 2016

## Conference Presentations (Selected from Past 5 Years)

4. I. Khakpour, A. R. Baboukani, A. Allagui, and C. Wang. Bipolar electrochemically exfoliated graphene for supercapacitor application. In *235<sup>th</sup> ECS Meeting*, Dalas, TX, USA, May 2019
3. A. Allagui, Z. Said, M. A. Abdelkareem, A. S. Elwakil, M. Yang, and H. Alawadhi. Dc energy storage and ac line filtering of graphene micro-sheets prepared with plasma micro-discharges. In *International Conference on Advances in Functional Materials, University of California, Los Angeles Campus, USA, Aug. 2017*

2. A. Allagui. Electrochemical energy storage: Opportunities and challenges. In *Middle East Energy Storage Forum*, May 2017
1. A. Allagui, H. Alawadhi, M. A. Abdelkareem, and A. S. Elwakil. Onestep preparation of reduced graphene oxide thin films by bipolar electrochemistry in deionized water. In *Advances in Functional Materials Conference (AFM-2016)*, August 2016

## Technical Reports

4. A. Allagui and G. Valette. Echauffement de résistances électriques sur poly-silicium. Technical report, Ecole Polytechnique de Nantes, Nantes, France, 2007.
3. A. Allagui. Joule-thompson effect in gas pressure regulators. Technical report, RMG Regel + Messtechnik GmbH. by Honeywell, Kassel, Germany, 2007.
2. A. Allagui. Gas pipe transient flow calculation. Technical report, Bryan Donkin RMG Ltd., by Honeywell, Chesterfield, England, 2006.
1. A. Allagui. Acoustic pressure level in gas pressure regulators. Technical report, Bryan Donkin RMG Ltd., by Honeywell, Chesterfield, England, 2006.

## Research Experience

2011 – 2013 **Postdoctoral Researcher**, *University of Ottawa*, Ottawa, Canada.

- Managed a group of 8 research engineers including performance review, daily supervision, mentoring and training;
- Handled the responsibilities of publishing the results of significant research projects;
- Provided advice on research and development options available in the group;
- Characterized nanomaterials by SEM-TEM/EDS, XRD, XPS, SAXS, ICP-AES;

2006 **R&D Engineer**, *Honeywell Process Solutions*, Chesterfield, England.

- Designed and implemented a customized spring calculation software to reduce project lead work and engineering rework;
- Designed and implemented a customized acoustic pressure level calculation software for gas pressure regulators;
- Simulated transient gas flow in pipes as part of gas valves products development.

## TEACHING AND CURRICULUM DEVELOPMENT

### Teaching Interests

- Materials Science & Engineering
- Energy Storage
- Probability & Statistics
- Heat Transfer
- Statics and Dynamics
- Electrochemistry
- Solar PV Systems
- Fuel Cells
- Numerical Methods
- Fluid Mechanics
- Nonequilibrium Thermodynamics

## ***Teaching Experience***

- 2019 – Present **Associate Professor**, *University of Sharjah*, Sharjah, UAE.  
Spring 2020/21 0406101 Statics and Dynamics, 0406320 Solar PV Systems  
Fall 2020/21 0406201 Materials Engineering, 0406320 Solar PV Systems  
Spring 2019/20 0406201 Materials Engineering, 0406463 Fuel Cells, 0406206 Energy Storage  
Fall 2019/20 0406206 Energy Storage  
Spring 2018/19 0406206 Energy Storage, 0406320 Solar PV Systems
- 2013 – 2019 **Assistant Professor**, *University of Sharjah*, Sharjah, UAE.  
Fall 2018/19 0406206 Energy Storage, 0406463 Fuel Cells  
Spring 2017/18 0406320 Solar PV Systems, 0406201 Materials Engineering, 0406491-2 Senior Design Project  
Fall 2017/18 0406206 Energy Storage, 0406491-2 Senior Design Project  
Spring 2016/17 0406206 Energy Storage, 0406201 Materials Engineering  
Fall 2016/17 0406206 Energy Storage  
Spring 2015/16 0406206 Energy Storage and Transmission, 0406201 Materials Engineering  
Fall 2015/16 0406206 Energy Storage and Transmission  
Spring 2014/15 0406201 Materials Engineering, 0406206 Energy Storage and Transmission  
Fall 2014/15 0406201 Materials Engineering, 0406463 Fuel Cells  
Spring 2014/15 0406440 Biomass Energy Systems, 0406463 Fuel Cells  
Fall 2013/14 0406201 Fluid Mechanics, 0406463 Fuel Cells
- 2012 **Substitute Professor**, *University of Ottawa*, Ottawa, Canada.  
Fall 2012/13 CHG 3724 Chemical Thermodynamics
- 2008 – 2011 **Substitute Professor**, *Concordia University*, Montreal, Canada.  
Winter 2010/11 BCEE ENGR 251/4 Thermodynamics I  
Fall 2010/11 MIE ENGR 371/2 Probability and Statistics in Engineering  
Summer 2007/08 MIE ENGR 391/1 Numerical Methods in Engineering

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## **ADVISING AND MENTORING**

### ***Undergraduate Student Projects***

- 2019 – 2020 **Rahaf A. Alsani, Huda A. Balghaith, Maha H. Al-Ali.**  
Inkjet Printed Carbon Material for Electrochemical Energy Application
- Afra Ahli, Meera Almuaini, Juwahir Alkaabi.**  
High-energy/high-power hybrid batteries/supercapacitors system for electrical vehicles applications
- Hebatalla M. Gamil, Somaia M. Ahmed, Meera K. Alhammadi.**  
Mixed Metal Oxides for Electrochemical Ammonia Sensors
- Omar M.O. Muhaisen, Iyas M. H. Murad, Adnan Adel Abdou Hassan.**  
Performance of a Hybrid Solar Photovoltaics and Dimethyl Ether Methanol Thermochemical System
- Mohamed Rlrayah, Osman Saleh, Aasim Ahmed.**  
Piezo-Electric Power Generation in Electric Vehicles
- 2018 – 2019 **Mohammed A. Doukh, Mohammed A. Abuhweij, Nayyef K. Awad.**  
Metallic nanomaterials for chemical-to-optical energy conversion

- Tariq A. Alkhunayni, Abdulla M. Mohammed, Tariq A. Abdulaal.**  
Hybrid Battery-Supercapacitor System for Uninterruptible Power Supply Applications
- Shahad A. Jassim and Fotoun S. Mohamed.**  
Direct Urea Fuel Cell as a Power Source from Waste and Fertilizers
- 2017 – 2018 **Aisha Naqbi, Dilara Alkhazali, Salma Hamed.**  
Flexible Textile Supercapacitor for Wearable Electronics
- Abdo Aldin, Ahmad Albalooshi, Ammar Aljundi.**  
Supercapacitors as Two-in-one Energy Storage and AC Line Filtering Devices
- Fotoun Aldahmani, Shahad Alblooshi.**  
Direct Urea Fuel Cell as a Power Source from Waste and Fertilizers
- Arwa Fikri, Khadeijah Alzeyoudi, Noura Aldarmaki.**  
Self-Supported 3D Foam Architecture for Na-Ion Batteries
- 2016 – 2017 **Aya Alteneiji, Latifa Alkitbi, Shamma Alteneiji.**  
Hybrid Piezo-Supercapacitor Device for two-in-one Energy Harvesting and Storage
- Juveiriah Mohammed Ashraf, Malathe Khalil.**  
All-solid-state Micro-supercapacitors using Reduced Graphene Oxide Thin Films by Bipolar Electrochemistry
- 2015 – 2016 **Alsayed Ali, Mohamed A. Assad, Yazan Alhaj.**  
Submerged Micro-plasma-assisted Machining of Brittle Materials
- Ahmad Imad, Jareer Obay, Ahmad Abu Samra.**  
Si Nanowires of Enhanced Optical and Electrical Properties For Solar Cells Applications
- Fatima Alhammadi, Mina Al-mulla, Salma Alomari.**  
A Microbial Fuel Cell for the Generation of Electrical Energy from Waste
- 2014 – 2015 **Asma Almazrouei, Fatima Alnaqbi, Maryam Almazrouei.**  
Synthesis and Characterization of Composite Graphite-Nano-sized Nickel Oxides by Plasma Microdischarges for Supercapacitor Applications
- Khalid Mustafa, Yacoub Abdulaziz, Mustafa AlKaaby.**  
Photoelectrochemical Water Splitting Using ZnO Semiconductors
- Yuser Alani, Camilia Aokal, Nagham Yaseen.**  
Synthesis and Characterization of Graphene Nanosheets by Contact Glow Discharge Electrolysis
- 2013 – 2014 **Mohammed Khalaf, Ahmad Kiswani, Amjad Qaddourah.**  
Electrochemical Energy Storage in Nano-sized Particles of Nickel Oxides

## RELATED WORK EXPERIENCE

- 2007 – 2010 **Proposal Consultant, Leader Consult Group, Nabeul, Tunisia.**
- Implemented and maintained new ERP-CRM practice to manage existing accounts resulting in 30% account retention and 150% sales-growth objectives;
  - Supervised the preparation of tender bid responses (83% dossier qualification) for:
    - gas pressure regulating stations (M\$ 2.0), flowmeters, valves (M\$ 0.5), flow correctors (M\$ 0.1), gas chromatographs (M\$ 1.0), gas pipelines (M\$ 30),
    - power transformers (M\$ 7.0), power lines (M\$ 30),
    - oxidized starch (M\$ 0.8), resins (M\$ 0.5), precious catalysts (M\$ 0.5).

- 2007 **Project Engineer**, *Honeywell Process Solutions*, Kassel & Fürstenwalde, Germany.
- Prepared high impact technical offers for gas pressure expansion stations, thermal power plants, pressure regulators and safety valves;
  - Calculated the filtering, pressure regulating and flow metering units in P&ID diagrams;
  - Improved the Max-Flow software for gas pressure regulating station sizing for faster processing time and readability;
  - Suggested recommendations related to the development of products and services for the North African market.
- 2005 **Calibration Specialist**, *RMG Messtechnik*, Butzbach, Germany.
- Examined and calibrated RMG's gas turbine flow meters for custody transfer;
  - Improved the calibration procedure of gas turbines resulting in +50% saving on regular time;
  - Investigated and wrote report on the mutual effect of serially mounted flow meters during calibration;
  - Received quality training on the US flow meters and gas chromatograph process.

## **SERVICE AND PUBLIC OUTREACH**

### ***Service to the Profession***

#### **Editorial Board:**

- 2018 – Present Heliyon (Elsevier).  
 2017 – Present AEÜ - International Journal of Electronics and Communications (Elsevier).

#### **Guest Editorials:**

- 2018 Ben Jang, Xin Tu, Chang-jun Liu and Anis Allagui  
 Special Issue on Scientific Advances of Catalysis via Plasma Technology, Catalysis Today (Elsevier).
- 2017 Costas Psychalinos, Ahmed S. Elwakil, Anis Allagui and Aleksei Teplyakov.  
 Special Issue on Recent Advances in the Design and Applications of Fractional-Order Circuits and Systems, AEÜ - International Journal of Electronics and Communications (Elsevier).

#### **Peer Reviewing for:**

- Journal of Power Sources (× 30)
- Journal of the Electrochemical Society (× 7)
- Electrochimica Acta (× 6)
- Journal of the Electroanalytical Chemistry (× 3)
- IEEE Transactions on Industrial Electronics (× 4)
- IEEE Transactions on Power Electronics (× 4)
- IEEE Transactions on Energy Conversion (× 2)
- IEEE Sensors Journal (× 1)
- Advanced Materials (× 1)
- ACS Omega (× 1)
- ChemPhysChem (× 1)
- Journal of Chemical Technology & Biotechnology (× 1)
- Industrial & Engineering Chemistry Research (× 1)

- Journal of Applied Physics (× 1)
- Communications in Nonlinear Science and Numerical Simulation (× 1)
- Journal of Applied Electrochemistry (× 1)
- Microelectronics Journal (× 1)
- Plasma Science and Technology (× 3)
- ECS Solid State Letters (× 1)
- International Journal of Bifurcation and Chaos (× 1)
- International Journal of Circuit Theory and Applications (× 1)
- Ceramics International (× 1)
- Materials and Design (× 1)
- Water and Environment Journal (× 1)
- Environmental Technology (× 1)

### ***Service to the University/College/Department***

- 2021 Talk entitled *Deconvolution of Capacitance* for the Wang's Research Group, Florida International University, FL, United States.
- 2019 Talk entitled *Towards Understanding the Short-Term Memory Effect: Artificial Memory in Electrochemical Capacitors* for the 4<sup>th</sup> Sciences and Engineering Research Groups Forum, University of Sharjah, Sharjah, UAE.
- 2019 Member of Dept. of Sustainable and Renewable Energy Engineering Ph.D Curriculum Committee, University of Sharjah, Sharjah, UAE.
- 2019 Member of Dept. of Sustainable and Renewable Energy Engineering Promotion Committee, University of Sharjah, Sharjah, UAE.
- 2018/20 Member of College of Engineering Research Committee, University of Sharjah, Sharjah, UAE.
- 2018 Talk on *On the Constant-Phase Element for Time- and Frequency-Domain Characterization of Electric Double-Layer Capacitors*, University of Sharjah, Sharjah, UAE.
- 2017 Participated in the 2017 Scientific Research and Development Retreat of the University of Sharjah, Khorfakan, UAE.
- 2017 Talk on *All-solid-state Graphene Micro-sheets Supercapacitors prepared by Contact Glow Discharge Electrolysis*, Functional Materials: Synthesis, Characterizations and Applications (Jan 29–31, 2017), University of Sharjah, Sharjah, UAE.
- 2016 Talk on *Graphene and Graphene-based Materials for Energy Applications: Opportunities and Challenges*, UAE Innovation Week 2016 Expo Centre Sharjah, Sharjah, UAE.
- 2016 Member of the Committee for Establishment of Functional Nanomaterials Synthesis Laboratory, University of Sharjah, UAE.
- 2015 Member of the College of Engineering Organizing Committee for the UAE Innovation Week 2015, University of Sharjah, UAE.
- 2014 Talk on *High current density electrochemistry* at the 4<sup>th</sup> College of Engineering Seminar Series, University of Sharjah, UAE.
- 2014 Talk on *Plasma micro-discharges and applications* at the Ph.D Seminar Series, University of Sharjah, UAE.



2013 Invited speaker at the course of Electrochemical Engineering. Talk on *High Current Density Electrochemistry and Applications*, University of Ottawa, Ottawa, Canada.

2013 Talk on the *Electrocatalytic oxidation of ammonia on Ni<sub>98</sub>Pd<sub>2</sub> nanomaterials in alkaline media* at the Seminar Series of the Centre for Catalysis Research and Innovation, University of Ottawa, Ottawa, Canada.

### **Public and Other Service**

2017 Talk on *Opportunities and challenges present for implementing electrochemical energy storage* at Middle East Energy Storage Forum, UAE.

2015 Talk on *Contact Glow Discharge Electrolysis for the Synthesis of Nanomaterials for Energy Storage and Photoelectrochemical Applications* at the Physics Department Seminar Series, UAE University, UAE.

2013 Talk on *Building micro- and nanosystems using electrochemical discharges*, UAE–Sweden Research & Academic Symposium, Zayed University, UAE.

2012 – 2013 Principal lecturer at the *Introduction to L<sup>A</sup>T<sub>E</sub>X Typesetting Workshops* for writing articles, CVs, theses and books, University of Ottawa, Ottawa, Canada.

2012 Lecturer at the *Basics of WordPress Website Design*, Dar Assunnah, Ottawa, Canada.

2007 – 2013 Volunteer member of the Association des diplômés de Polytech’Nantes, Nantes, France.

2007 – 2011 Member of Concordia University Graduate Students’ Association, Montreal, Canada.

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## **LANGUAGE SKILLS**

Arabic **Mother tongue**

English **Fluent**

French **Fluent**