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## SUMMARY

Research Chemist and Engineer (E.I.T) with more than 5 years of laboratory or industrial experience in energy, CO<sub>2</sub> capture, and chemical manufacturing. Experienced in MEA/electrode development, process monitoring, scale-up design, and problem-solving, improving laboratory performance by 35 % and 15 % in product development.

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## SKILLS

- Expertise in lab/pilot-large-scale process design, product development, analysis/interpret data, develop testing plans
  - Detailed working knowledge and experience in membrane electrode assemblies (MEA) preparation, CH<sub>4</sub>/CO<sub>2</sub> conversion by electrolyzer, electrochemical electrolysis processes, electrocatalysts synthesis, PEM membrane synthesis, and nanomaterial synthesis (CNT, GO)
  - Hands-on experience in performing/troubleshooting/setting electrochemical testing (EIS, CV), electrochemical cell, electrodes assemble, R&D electrochemical electrolysis, data logging software, material characterization, lab instruments such as SEM, GCMS, BET, TGA
  - Strong knowledge of technical report writing, R&D electrochemical studies, and research projects
  - Solid understanding of polymer-materials science, electrochemistry, nanotechnology, hydrogen fuel cell technology, ionomers
  - Proficient in data analysis, visualization, and presentation (Excel, Power BI, PowerPoint); DOE experience (Minitab); process drawings (P&IDs/PFDs); process simulation (HYSYS); programming (MATLAB, Python); machine learning
  - Knowledge of Heat & Material Balance, process drawings (P&IDs/PFDs), process equipment, process equipment, electrochemical processes, writing technical reports, electrochemistry
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## WORK EXPERIENCE

### 1-Carbon Corp, Calgary, Canada

#### Research Scientist

**November 2022 -November 2023**

- Collaborated in materials development and scale-up of CO<sub>2</sub> electrolysis reactor, through system control, electrolysis operating, electrolyte/electrode preparation, materials testing, and analysis results, leading to improved product consistency and quality.
- Collaborated with the team in process development by optimizing process parameters, including temperature, current/voltage, and CO<sub>2</sub> flow, using process simulation HYSYS to maintain process conditions, and enhance plant efficiency by 10%.
- Analyzed data, components performance (electrode/electrolyte materials), and, operational parameters to identify improvement areas; through Matlab/Simulink and DOE, resulting in 10 % increase in product quality.
- Troubleshoot and operated R&D CO<sub>2</sub> electrolysis, adjusting parameters, data logging, repairing (fitting, electrical parts), assembly/replacement of electrodes, and preparation electrolyte (mixing powder materials) to ensure performance and data accuracy.

### 2-Institution of Energy and Hydrogen, UQTR, Quebec, Canada

#### Researcher

**September 2019- July 2022**

- Synthesized and developed the nanocomposite polymer electrolyte membrane for high-temperature fuel cells, using a combination of (AMPS/VP/GO)/PVA and implemented electrochemical tests (CV, EIS) and analytical tests to increase 15% thermal stability.
- Established a synthetic route for graphene oxide-G-CNT as electrocatalyst Pt supporter; conducted analysis, and characterization tests (FTIR, SEM, TEM, TGA); executed electrochemical testing (CV) to evaluate catalytic activity, leading to a 10% enhancement in efficiency.
- Assembled, and monitored fuel cell stack and parts, adjusting operational parameters, flow meter, repairing/replacing (fitting, connections, flow gauge, stack parts); optimized experimental designs, ensuring precision and accuracy in processes.
- Executed the precise preparation of MEA, ink, slurry, and electrode coating (brush/spray), optimized the functionality of the lab fuel cell stack; and Implemented chemical/physical, durability, and electrochemical tests on MEA and PEM.
- Designed and planned experiments to create a fast-paced and detail-oriented lab environment. Governed the maintenance, calibration, and operation of electrochemical equipment, Potentiostats/Galvanostats, electrodes, lab fuel cell stack to ensure the precision of results.

### 3- Petro Sanat Haffar (PSH)

#### Research Engineer Lead

**March 2012-September 2019**

- Collaborated with the multidisciplinary team to scale up new chemical additives, implementing materials synthesis, test design, optimizing the formula of monomers, and polymerization process control, resulting in production for 6 months.
- Optimized batch chemical production resulting in a 12% increase in throughput by redesigning the mixing process and improving the residence time. Supported team by conducting H&MBs calculation by HYSYS to improve process performance.
- Assisted in the design and installation of process equipment for the production line (documenting and updating processing drawing (PFD, P&ID), pumps, piping, and control system), resulting in a 10% increase in production capacity and a 5% reduction in maintenance costs.

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## TRAINING AND CERTIFICATION

- Certified, Occupational Safety and Health: Hazard Communication, LinkedIn, 2024
- Training, Workplace Hazardous Materials Information System (WHMIS), Carbon Corp, Canada, 2022

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## EDUCATION

- **Ph.D. in Material Science and Energy**  
University of Quebec a Trois Rivieres, Quebec, Canada, July 2022
- **MSc. in Chemical Engineering**  
Azad University, Iran, September 2008
- **BSc. in Chemistry**  
Azad University, Iran, September 2005

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## PROJECT:

- Searched on proton exchange membrane fuel cell (HT-PEMFC) optimization using Machine Learning March 2024 – July 2024
- Implemented a research project on process simulation for hydrogen production by PEM electrolyzer using HYSYS software.

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## PUBLICATIONS

1. A. Narimani, F. Kordnejad, M. Hemmati, A. Duong. Synthesis, characterization, thermal, and rheological properties of nanocomposite hydrogel based on HPG-g-poly (AM-co-AMPS)/GO. Journal of dispersion science and technology, Published online: 23 Sep 2022.
2. A. Narimani, F. Kordnejad, P. Kaur, J. Trivedi, F. Najmeddine, M. Hemmati, A. Duong. Synthesis and preparation of poly (AM-co-AMPS)/GO nanocomposites hydrogel and its performance as a rheology modifier. Journal of dispersion science and technology. Published online 2022
3. A. Narimani, F. Kordnejad, P. Kaur, S Bazgir, M. Hemmati, A. Duong. Rheological and thermal stability of interpenetrating polymer network hydrogel based on polyacrylamide/hydroxypropyl guar reinforced with graphene oxide. Journal of polymer engineering, 2021, 41, 788-798.
4. A. Narimani, H. Hemmati, Electrical and steady shear rheological behavior of polypropylene composites reinforced with single-walled carbon, Polymers and polymer composites, 2014, 22, 533-540.
5. A. Narimani, M. Hemmati, Effect of single-walled -carbon nanotube (SWNT) on mechanical, rheological and physical properties of thermoplastic elastomer based on PP/EPDM, Science, and engineering of composite materials, 2014, 21, 15-21.
6. A. Narimani, H. Hemmati, Study on the electrical and rheological percolation threshold of single-walled - carbon nanotube reinforced thermoplastic elastomer based on PP/EPDM, Journal of thermoplastic composite materials, 2013, 1-20.
7. A. Narimani, M. Hemmati, H. Shariatpanahi, A. Fereidoon, and M. Ghorbanzadeh, Effect of polypropylene-grafted-maleic-anhydride compatibilizer on the physical properties polypropylene/carbon nanotube composites, Polymers, and polymer composites, 2012, 20, 559-566.
8. M. Hemmati, A. Fereidoon, H. Shariatpanahi, M. Ghorbanzadeh, A. Fereidoon, A. Narimani, Effects of nanoclay on morphology, rheological, and mechanical properties of PVC/ABS, Polymer - plastic technology and engineering, 2012, 51, 413-418.
9. M. Hemmati, A. Narimani, H. Shariatpanahi, A. Fereidoon, and M. Ghorbanzadeh, Study on morphological, rheology and mechanical properties of a thermoplastic elastomer polyolefin(TPO)/carbon nanotube composites with reference to the effect of PP-g-MA as a compatibilizer, International journal of polymeric material, 2011, 60, 384-397.

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## SEMINARS

1. A. Narimani, A. Duong. Fuel cell technology in cold & hot weather and proton exchange membrane (PEM) based polymer materials, UQTR, Duong Lab, April 2021
2. A. Narimani, Frehi Najemliddin. Utilisation de la sonochimie pour la synthèse d'un composite à base du métal organique Framework et de Graphene for hydrogène Storage. QCAM, March, 2021
3. A. Narimani, A. Duong. Production of hydrogen by in-situ combustion method, UQTR, Duong Lab, April 202