Mohamed Mahrous
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EDUCATION

PhD Electrical and Computer Engineering, Jan 2024 – Dec 2027
University of Toronto, Canada
Master of Science (Nanotechnology) **with Honors**, Feb 2020 – July 2023
The American University in Cairo (AUC), Egypt
Bachelor of Science (Double major; Chemistry and Physics), Sep 2012 - May 2016
University of Sohag, Egypt

WORK EXPERIENCE

AI Application Engineer (Internship), Pulsenics, Canada, June.2025 – Oct 2025

- Developing a novel algorithm for Pulsenics' online electrochemical analysis platforms to enhance diagnostics and system monitoring capabilities using Machine Learning.

Graduate Teaching & Research Assistant, University of Toronto, Canada, Jan.2024 – Present

- Winter 2024, Teaching Electricity and Magnetism laboratory - ECE221H1.
- Fall 2024, Teaching Mathematical Physics (Multivariable calculus) - MAT291H1.
- Modeling energy systems.

Visiting Research Scholar, Johns Hopkins University, Baltimore - USA, Jul.2023 – Dec.2023

- Conduct research, collect and analyze data under the guidance of a postdoctoral. • Worked on the design of High Entropy Alloys

Assistant Lecturer, Universidade Nova de Lisboa (part time), Cairo - Egypt. Sep.2022 – Dec.2022

- Teaching and facilitating student learning, involving delivering lectures for the Foundational Chemistry Course.

Research assistant, EML Laboratory-Computational subgroup, The American University, Cairo - Egypt. Nov.2018 – Jul.2023

- Carrying out computational calculations and developing novel materials with new properties.
- Conduct ab initio simulations on molecular surface interaction for the design of novel functional materials for catalysis and sensors applications.

Teaching Assistant, University of Prince Edward Island, Cairo - Egypt, Oct.2018 – Oct.2020

- Teaching General Chemistry course, and Sustainable Design.

Quality control specialist, Quality Department, PFNonwovens, Cairo - Egypt, Dec.2016 – Oct.2018

- Monitored the quality of the products, testing parameters, working procedures, and performing audits on other departments.

Training and Workshops

- **Participant**, American Control Conference (ACC 2024) - American Automatic Control Council, Toronto, Canada (2024)
- **Poster Presenter,** Materials Research Society (MRS) Fall Meeting, Boston, USA (2023)
- **Poster Presenter,** Green Chemistry and Climate Change Summer School, Ca' Foscari University of Venice, Italy (2021)
- **WHMIS 2015 Certification,** University of Prince Edward Island, Canada (2018)
- **ISO Systems & 6S Training**, PFNonwovens, Egypt (2016)
- **Undergraduate Research Assistant,** Egyptian Center for Theoretical Physics, Egypt (2015)

SKILLS

- **Languages**: English (Fluent), Arabic (Native), French (Beginner)
- **Software & Tools:** Microsoft Office Suite; OVITO, OriginPro, VESTA, Avogadro, and XCrySDen for materials visualization
- **Computational Modeling:** DFT, Molecular Dynamics (MD), and Molecular Mechanics using Material Studio, GULP, Quantum ESPRESSO, LAMMPS, and VASP
- **Programming:** Python and C (data processing, numerical simulations, and automation)
- **Machine Learning:** Regression, classification, time series, and clustering using Python (NumPy, Pandas, Scikit-learn, Matplotlib)
- **Data Analytics & Visualization:** Data wrangling, exploratory analysis, and scientific visualization using Python and OriginPro
- **Quantitative Modeling:** PDEs, State-space equations, transport equations, and optimization
- **High-Performance Computing:** Parallelization using MPI; experience with cluster and HPC environments
- **Project Management & Cross-Functional Collaboration**: Experienced in interdisciplinary teamwork and research coordination

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Publications

1. Abbas, W. A., Shaheen, B. S., Ghanem, L. G., Badawy, I. M., **Abodouh, M. M.,** Abdou, S. M., Zada, S., & Allam, N. K. (2021). Cost-Effective Face Mask Filter Based on Hybrid Composite Nanofibrous Layers with High Filtration Efficiency. In Langmuir (Vol. 37, Issue 24, pp. 7492–7502). American Chemical Society (ACS). https://doi.org/10.1021/acs.langmuir.1c00926

2. Sanad, M. F., Puente Santiago, A. R., Tolba, S. A., Ahsan, M. A., Fernandez-Delgado, O., Shawky Adly, M., Hashem, E. M., **Mahrous Abodouh, M.,** El-Shall, M. S., Sreenivasan, S. T., Allam, N. K., & Echegoyen, L. (2021). Co–Cu Bimetallic Metal Organic Framework Catalyst Outperforms the Pt/C Benchmark for Oxygen Reduction. The American Chemical Society (Vol. 143, Issue 10, pp. 4064–4073). American Chemical Society (ACS). https://doi.org/10.1021/jacs.1c01096

3. Elfarargy, R. G., Saleh, M. A., **Abodouh, M. M**., Hamza, M. A., & Allam, N. K. (2022). Graphitic Carbon Nitride Nanoheterostructures as Novel Platforms for the Electrochemical Sensing of the Chemotherapeutic and Immunomodulator Agent MTX. Biosensors (Vol. 13, Issue 1, p. 51). MDPI AG. https://doi.org/10.3390/bios13010051

4. Leil, R., **Abodouh, M. M.,** Javed, N., Sreekumar, S., Pacheco, H., Tarek, N., O'Carroll, D. M., & Allam, N. K. (2024). Untapped potential of scrap brass alloy: a new frontier in the use of brass based photocathodes for stable and durable photoelectrochemical water splitting. In Energy Advances (Vol. 3, Issue 2, pp. 430–441). Royal Society of Chemistry (RSC). https://doi.org/10.1039/d3ya00534h

5. **Abodouh, M. M.,** Khedr, G. E. & Allam, N. K. (2024). Optimizing diamond's electronic band structure via defect engineering for enhanced HER and OER catalysis. International Journal of Hydrogen Energy vol. 61 922–933 (2024). https://doi.org/10.1016/j.ijhydene.2024.03.008

6. Hkiri, K., Mohamed, H. E. A., **Abodouh, M. M.** & Maaza, M. Experimental and theoretical insights into the adsorption mechanism of methylene blue on the (002) WO3 surface. Scientific Reports vol. 14 (2024). Nature https://doi.org/10.1038/s41598-024-78491-3
7. Mara Jezernik Nigel Patterson, Julian Rosas, Mariam Awara, Benjamin Maxwell, Essam Elsahwi, Cynthia A. Rice, **Mohamed Mahrous Abodouh**, In-Operando EIS Monitoring of a PEM Fuel Cell Stack to Understand the Influence of Different Operating Conditions on Stack Performance. ECE conference, https://ecs.confex.com/ecs/248/meetingapp.cgi/Paper/211008