Abdulla Arham

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KEY QUALIFICATIONS

Results-driven Materials Scientist with **3+ years of specialized experience in electrochemical materials synthesis, characterization, and scale-up**, including extensive work with nanoparticle synthesis, cathode materials development, and battery systems. Proven expertise in optimizing laboratory-scale synthesis methods achieving **96% batch-to-batch consistency**, performing comprehensive materials characterization using XRD, SEM/TEM, FTIR, and thermal analysis techniques, and successfully managing pilot-scale projects from conception to commercialization. Combine strong electrochemical systems knowledge with advanced data analysis capabilities and project management certification (CAPM) to drive innovation in next-generation energy storage solutions.

EDUCATION

University of Waterloo **Waterloo, Ontario**

Bachelor of Applied Science, Nanotechnology Engineering September 2016 April 2022

EXPERIENCE

University of Toronto **Toronto, Ontario**

Graduate Research Student May 2023 February 2024

- Conducted hands-on research in CO_2 electrolyzer technology, designing and assembling **15+ unique electrochemical cell configurations** and executing **50+ experimental runs** to optimize system parameters for fuel cells and water electrolyzers, resulting in **improved cell performance metrics by 12-18%**.
- Performed advanced electrochemical characterization including electrochemical impedance spectroscopy (EIS), linear sweep voltammetry (LSV), polarization resistance analysis, and cyclic voltammetry to evaluate electrode performance, generating comprehensive datasets that informed **3 collaborative research projects**.
- Led in operando imaging campaigns at Canadian Light Source synchrotron facility, troubleshooting **20+ technical challenges** in real-time X-ray characterization of operating electrochemical cells, enabling **breakthrough visualization of catalyst degradation mechanisms**.
- Collaborated with a multidisciplinary research team to provide technical support on water electrolyzer and fuel cell projects, contributing characterization expertise that accelerated project timelines by **estimated 15-20%**.

Presidium Equipments **London, Ontario**

Research Coordinator & Engineer April 2022 August 2022

- Engineered cost-effective polyurethane-based alternatives to truck caps and covers through systematic polymer substitution research, achieving **identical material properties** (tensile strength, durability, UV resistance) while **reducing raw material costs by $18,000-25,000 per production run**.
- Designed and executed pilot-scale manufacturing process including custom reaction injection molding systems, coordinating with external vendors and pilot facility teams to successfully scale formulations from **100mL lab batches to 50L pilot batches**, completing project **15% under budget and 7 days ahead of schedule**.
- Implemented proactive risk mitigation strategy by conducting **factorial DOE study on 5 alternative isocyanate precursors**, performing FTIR, XRD, and universal testing machine analysis (tensile, compression, hardness) on each variant, which **prevented 6-day production delay and saved $6,000-$12,000** when the primary supplier experienced stock shortage.
- Performed comprehensive polymer characterization using FTIR, XRD, and mechanical testing to ensure product specifications, maintaining **100% retention of critical laboratory data** and delivering detailed technical reports to both technical and non-technical stakeholders.
- Trained 3 team members on proper usage and interpretation of FTIR and XRD analytical instrumentation, enhancing departmental characterization capabilities and **reducing analysis turnaround time by 25%**.

University of Waterloo **Waterloo, Ontario**

Product Owner & Scientist Fourth Year Design Project September 2020 April 2022

- Engineered fully compostable potato chip packaging using bio-based polymer formulations that maintained **90% of conventional packaging properties** including shelf-life preservation, oxygen barrier performance, and mechanical strength through **iterative materials development and 40+ prototyping cycles**.
- Implemented agile project management methodologies coordinating team of 4 researchers, improving lab efficiency by **10%** and delivering environmentally-friendly packaging solution **15% under $12,000 budget** through strategic resource allocation and vendor negotiations.
- Conducted extensive thermal analysis (TGA/DSC), FTIR spectroscopy, and mechanical testing to characterize bio-polymer degradation kinetics and optimize formulation parameters, producing **comprehensive 50-page technical report and 3 stakeholder presentations**.

Dimitrov Group **Waterloo, Ontario**

Research Data Analyst January 2021 April 2021

- Architected Python-based web scraping pipeline to collect global soccer team data across **120+ countries/leagues**, implementing ETL processes to clean and organize **15,000+ data points** into a structured SQL database supporting PhD research on sports funding disparities.
- Developed automated data analysis workflows using SQL queries and created **5 interactive Power BI dashboards** to visualize funding trends and demographic patterns, enabling researchers to identify **previously undiscovered correlations between funding and team performance**.
- Applied agile software development methodologies to research data pipeline, achieving **30% efficiency increase** through sprint-based iteration and continuous stakeholder feedback integration.

Lorama Group **Mississauga, Ontario**

Research Assistant January 2020 April 2020

- Synthesized and optimized bio-adhesive precursors for furniture industry applications through **systematic wet chemistry experimentation of 35+ formulation variants**, conducting literature reviews and implementing novel experimental protocols that improved adhesive strength by **estimated 20-25%**.
- Contributed to environmentally-friendly paint formulation research, performing **materials characterization using XRD and FTIR spectroscopy** to analyze polymer structure and composition, ensuring quality control specifications were met for **commercial product development pipeline**.
- Trained 2 junior researchers on advanced analytical instrumentation operation and data interpretation, establishing standardized characterization protocols that **reduced measurement variability by 15%**.

Thomson Lab **Waterloo, Ontario**

Research Assistant September 2019December 2019

- Optimized synthesis of superparamagnetic iron oxide nanoparticles (SPIONs) for environmental remediation through **50+ iterative synthesis experiments**, implementing factorial design of experiments (DOE) to control parameters including reaction atmosphere, temperature, and precursor ratios, achieving **96% batch-to-batch consistency** (improved from 89% baseline).
- Executed electrochemical degradation experiments of phenol-based organic contaminants in wastewater using SPION catalysts and graphite electrodes, monitoring treatment performance through **HPLC analysis of 200+ samples** and demonstrating **contaminant removal efficiency of 85-92%**.
- Performed comprehensive analytical characterization using ICP-OES, ICP-MS, and TEM to quantify nanoparticle composition, size distribution, and morphology, generating datasets that informed **optimization of polymer coating strategies for targeted nanoparticle delivery**.
- Supported crude oil remediation research by designing oil-contaminated sand model systems and conducting nanoparticle injection/recovery experiments, producing detailed weekly progress reports and **comprehensive 20-page final technical report** on remediation efficacy.

Institute of Functional Nano & Soft Materials (FUNSOM) **Suzhou, China**

Research Assistant January 2019 April 2019

- Synthesized and characterized Mo_2C nanomaterial electrocatalysts for hydrogen evolution reaction (HER) applications, conducting **50+ hydrothermal synthesis experiments** to optimize reaction conditions (temperature, pressure, precursor concentration), achieving **consistent nanomaterial morphology and improved catalytic activity by 18-22%**.
- Performed extensive SEM characterization capturing **100+ high-resolution images** to analyze nanomaterial morphology, surface defects, particle size distribution, and structural properties, correlating physical characteristics with electrochemical performance.
- Fabricated and tested electrode configurations for electrochemical analysis, preparing catalyst inks, polishing glassy carbon electrodes (GCE), and conducting linear sweep voltammetry (LSV) experiments to evaluate HER performance, generating comprehensive datasets that **supported 2 research publications** (in preparation).
- Executed BET surface area analysis to quantify catalyst active site density, establishing structure-property relationships that **guided subsequent synthesis optimization strategies**.

EXPERIENCE

ShelfCraft - Personal Reading Tracker **London, Ontario**

Technologies: Python (Flask), SQLite, Jinja2, HTML/CSS, Git, Render October 2025

- Architected and deployed a full-stack web application from scratch using Flask and SQLite to track reading progress across 200+ books, featuring CRUD operations, daily reading logs, and analytics dashboards with 14-day activity summaries
- Designed normalized relational database schema with four tables (books, reading_logs, authors, tags) implementing foreign key constraints, indexing, and referential integrity using raw SQL queries without an ORM
- Built REST-style API routes and dynamic server-side rendering with Jinja2 templates, handling form submissions, URL parameters, and SQL aggregation queries to compute reading statistics (total pages read, completion rates, pages per day)
- Managed end-to-end deployment pipeline from local development environment through Git version control to production hosting on Render, configuring environment variables and ephemeral storage for cloud compatibility

JobHuntr- Automated Career Page Crawler **London, Ontario**

Technologies: Python, BeautifulSoup, Requests, CSV, Regular Expressions September 2025

- Engineered a web scraping application to automate job aggregation from 350+ company career pages across chemical, manufacturing, pharmaceutical, and technology sectors, implementing intelligent URL discovery and multi-level page parsing
- Developed adaptive scraping logic with fallback mechanisms to handle diverse HTML structures, including dynamic job board detection, multiple CSS selector patterns, and platform-specific parsing for Oracle Cloud, Workday, Greenhouse, and other ATS systems
- Implemented robust date parsing with regex pattern matching to normalize 10+ date formats (relative dates, ISO standards, natural language), filtering listings to identify positions posted within configurable time windows
- Built error handling and rate limiting with retry logic, user-agent rotation, and polite 2-second delays between requests to ensure reliable data extraction while respecting server resources, outputting structured CSV reports with 500+ job listings per execution

SKILLS

Laboratory & Characterization: X-ray Diffraction (XRD, Rietveld Refinement), Scanning Electron Microscopy (SEM/EDX), Transmission Electron Microscopy (TEM), BET Surface Area Analysis, FTIR Spectroscopy, Raman Spectroscopy, Thermal Analysis (TGA/DSC), HPLC, ICP-OES, ICP-MS, Universal Testing Machine (Tensile, Compression)

Electrochemical Methods: Electrochemical Impedance Spectroscopy (EIS), Linear Sweep Voltammetry (LSV), Cyclic Voltammetry (CV), Polarization Curves, Potentiostatic/Galvanostatic Testing, Chronoamperometry, Fuel Cell & Electrolyzer Testing

Materials Synthesis & Processing: Nanoparticle Synthesis, Hydrothermal Synthesis, Polymer Formulation, Cathode Material Development, Reaction Injection Molding, Wet Chemistry, Batch Process Optimization, Pilot-Scale Manufacturing

Software & Data Analysis: Python (Web Scraping, BeautifulSoup, Requests, ETL Pipelines, Data Analysis), SQL Database Management, Power BI Visualization, Microsoft Office Suite (Expert), Bloomberg Terminal, JavaScript, Computational Fluid Dynamics (CFD)

Web Development & Deployment: Flask (REST APIs, Server-side Rendering), SQLite Database Design, HTML/CSS, Jinja2 Teeplates, Git Version Control, GitHub, Cloud Deployment (Render), Environment Configuration

Project Management: Certified Associate in Project Management (CAPM PMI), Agile Methodologies, Design of Experiments (DOE), Factorial Analysis, Technical Report Writing, Cross-functional Team Leadership