PDF version | Tools | Open Topics | Private Space

## Introduction

**A process engineer** holding BASc. & MASc. in **Chemical Engineering** and MASc. in **Mining & Minerals Engineering**, with advanced **data analytics** skills, experienced in **inspecting, designing, optimizing, and evaluating large-scale industrial systems** in conjunction with **simulation, virtual environment training and data-driven** tools to **support design, development, and decision-making** with a focus on **enhancing operational efficiency, identifying potential issues and reducing costs**.

- **International work experience** across Asia, Europe, Middle East and North America within diverse cultural settings, built and maintained professional relationships.
- Independent, productive and active **team player**, always met deadlines and delivered projects with high-quality results.
- Skilled in identifying key questions with a root-cause approach, developing clear and compelling argumentation, and crafting effective **project budgets and timelines**.
- Successfully secured **funding** from international organizations including **European Union**.
- Authored **40+ publications** (h-index: 15) & **spoke at multiple international and national** venues.
- **Engineering Tools**
- **Programming**
- **Computational Materials**

**Real Life**

**Professional Networks**

**Social Media**

**Email**

## Education

The University of British Columbia

**Project**

Microwave assisted drying of minerals, with Dr. Ali G. Madiseh

**Project Goal**

**Retrofitting of conventional drying unit operations** at a local industrial mining partner.

**Project Summary**

Inspected and evaluated, experimentally and numerically (via Finite Element Modeling in COMSOL), the **feasibility and applicability** of microwave-based heating systems at a local **mining industrial partner** for the **retrofitting of conventional drying unit operations**.

**Tasks Performed**

- Performed experimental and numerical analysis of **mineral drying behavior under microwave exposure**.
- Utilized **finite element modeling** (FEM) to simulate heat and mass transfer during drying at various microwave power levels and **mineral types**.
- Conducted comprehensive **energy demand analysis** to evaluate **potential savings** compared to traditional kiln operations.

**Skills**

Energy Demand Analysis · Exergy & Pinch · COMSOL · FEM analysis · Computational Electromagnetism · Heat Transfer

University of Tehran

**Project**

Thermo-kinetic modeling of the wet phase inversion process for polymeric membranes fabrication, with Dr. Mohammad Ali Aroon

**Project Goal**

Developed a **comprehensive thermo-kinetic model** to simulate the wet phase inversion process for fabricating polymeric membranes, focusing on Multiphysics coupling and accurate prediction of **polymeric flat-sheet membrane structure evolution**.

**Tasks Performed**

- Constructed and solved **coupled heat, mass, and momentum transport models under non-equilibrium thermodynamics**, incorporating **moving boundary conditions in multiphase, multicomponent porous systems**.
- Formulated and implemented **partial and ordinary differential equation solvers (PDE/ODE)** to capture the transient dynamics of solvent-nonsolvent exchange and polymer precipitation.
- Wrote custom **code in Fortran, MATLAB, and C++** for high-fidelity numerical simulations and sensitivity analyses.
- **Validated computational results against experimental measurements**, achieving strong agreement in membrane morphology predictions.
- Gained insight into phase separation kinetics, diffusion mechanisms, and the impact of process parameters on membrane performance and structure.

**Skills**

C++ · Fortran · MATLAB · Transport Phenomena · Numerical Simulation · Mathematical Modeling · Polymer Physics

University of Tehran

**Project**

Simulation and cost evaluation of hot section of BIPC olefin plant, with Dr. Nasim Tahouni

**Project Goal**

Used **Aspen Hysys** and **Aspen Plus** to evaluate **retrofitting** of industrial scale **petroleum refinery** complex by producing process flow diagram (**PFD**), piping/process & instrumentation diagram (**P&ID**), **cost** and **utility**, pinch and exergy.

**Tasks Performed**

- Simulated existing and proposed **process configurations using Aspen HYSYS and Aspen Plus**, focusing on optimizing reactor and separation systems for olefin recovery.
- Developed and **documented detailed Process Flow Diagrams (PFDs) and Piping & Instrumentation Diagrams (P&IDs)** to map unit operations, control loops, and equipment connectivity.
- Performed **equipment sizing and specification** for heat exchangers, reactors, compressors, and distillation columns based on simulated operating conditions.
- Conducted **cost estimation and utility analysis** (CAPEX and OPEX) to support retrofitting and procurement decisions.
- Applied **pinch analysis and exergy analysis** to evaluate and enhance energy integration and thermodynamic efficiency across the system.
- Assessed **retrofitting feasibility** by integrating performance data, economic viability, and process safety considerations.

**Skills**

Aspen HYSYS · Aspen Plus · Aspen Dynamics · Chemical Engineering · Process Simulation · Cost-Benefit Analysis · Exergy

## Experience

University of Limerick

Under an EU Horizon 2020 Marie Sklodowska-Curie Postdoctoral Fellowship.

Read news here.

**Project (I)**

Fluid Bed Spray Dryer Process Monitoring and Engineering, with Dr. Marcus O'Mahony.

**Project Goal**

Designed and implemented a **data-driven graphical user interface** for real-time **monitoring** and **optimization** of a fluid bed spray drying process by integrating in-line/offline sensor data streams and advanced analytics into an interactive platform.

**Tasks Performed**

- Developed an interactive **graphical user interface (GUI) in MATLAB** for real-time data **visualization** and **diagnostics**, supporting both in-line and offline sensor data integration.
- Integrated and processed **diverse sensor types** including CCD camera feeds (image-based analysis), NIR sensors (unlabeled time-series), Raman spectroscopy probes (localized unstructured signals), and valve states (binary control signals).
- Performed extensive data preprocessing and cleansing to handle **high-dimensional and heterogeneous datasets** with missing values and sensor noise.
- Applied **pattern recognition** and signal analysis techniques to identify operational trends, detect anomalies, and support process optimization.
- Designed pipelines for real-time data ingestion and synchronization from multiple sensor sources, ensuring temporal alignment and reliable analytics under dynamic plant conditions.
- Collaborated with process engineers and control specialists to translate sensor insights into actionable process improvements and control strategies. **Skills** Data Analytics · Machine Learning · Data-Driven Process Control · Graphical User Interface · MATLAB · Python

**Project (II)**

Continueous Cocrystalization via Hot Melt Extrusion in Phamaceuticals, with Dr. Gavin Walker.

**Project Goal**

Developed a **data-driven digital twin framework** to address low-yield challenges in continuous crystallization, aiming to enhance product quality, optimize production, and reduce waste and operational costs in pharmaceutical manufacturing.

**Tasks Performed**

- Conducted detailed **root-cause analysis** of unit operations to identify inefficiencies affecting yield and product purity in **continuous crystallization systems**.
- Evaluated the influence of **critical process parameters**—temperature, residence time, screw configura-

tion, and rotation speed—on crystallization outcomes, using both experimental data and simulation insights.
- Designed and refined **process strategies*** to maximize desired product formation, suppress by-product generation, and reduce procurement and disposal costs.
- Built a digital twin using advanced **data analytics** and implemented a **machine learning-based process controller**, integrating both real-time (in-line) & historical (offline) **sensor data streams**-Raman spectroscopy.
- Utilized Density Functional Theory (DFT) and molecular dynamics (MD) simulations to analyze **molecular interactions**, guiding optimal cocrystal formation **pathways** and identifying **key process descriptors**.
- Integrated **Raman spectrometer** data into a live control system, enabling real-time feedback and control within a continuous manufacturing environment through predictive ML models.

**Skills**

Process Simulation · Molecular Dynamics · Density Functional Theory · Raman Spectroscopy · Machine Learning