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Kiarash Farajzadehahary

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SUMMARY

Polymer scientist and machine learning researcher combining experimental and computational expertise to develop chemistry-informed models that bring polymer knowledge to AI and deploying it for reactor control, with proven track record in collaborative R&D and high-impact publications.

EDUCATION

Doctor of Philosophy in Applied Chemistry and Polymeric Materials — **May 2022 – Present**
Dept. of Polymer Sci. & Tech., Faculty of Chemistry, University of the Basque Country — *San Sebastian, Spain*

Thesis Evaluation: [To be determined]
Thesis: Utilizing machine learning in emulsion polymerization
Supervisors: Prof. Nicholas Ballard, Prof. José M. Asua

Master of Science in Polymer Engineering, Polymer Processing — **Sep. 2017 – Oct. 2020**
Dept. of Polymer Engineering, School of Chemical Engineering, University of Tehran — *Tehran, Iran*

Cum. GPA: **18.44**/20 (4.0/4)
Thesis: Compatibilization of PHB/PCL blend: Morphological, rheological, mechanical, and thermal study
Supervisors: Prof. Mohammad Najafi, Prof. Babak Kaffashi; Advisor: Prof. Shervin Ahmadi

Bachelor of Science in Polymer Engineering, Polymer Industries — **Sep. 2012 – Feb. 2017**
Dept. of Polymer Engineering, School of Chemical Engineering, University of Tehran — *Tehran, Iran*

Cum. GPA: **15.39**/20 (3.0/4)
Research: Investigation on restorative dental resin composites
Supervisor: Prof. Mohammad Najafi

WORK EXPERIENCE

Visiting Researcher — **Feb. 2026 – Apr. 2026**
LCPO, University of Bordeaux — *Bordeaux, France*

- Develop polymer chemistry informed neural networks (PCINNs) for RAFT polymerization
- Implement optimization to guide automated flow reactor experiments toward optimal conditions

Research Assistant (RA) — **May 2022 – Present**
POLYMAT, Institute for Polymer Materials — *San Sebastian, Spain*

- Conduct research on machine learning applications in emulsion polymerization
- Develop neural network models and reinforcement learning algorithms for reactor control
- Design and execute experiments using reaction calorimetry and characterization techniques
- Prepare manuscripts for peer-reviewed journals, and present findings at international conferences
- Mentor undergraduate and master's students in laboratory techniques and computational methods

Software Instructor/Tutor (Remote) — **Mar. 2019 – Present**
Maktabkhooneh Online Platform — *Tehran, Iran*

- Autodesk Moldflow: Prepare course materials, assist students, and assess final projects

Teaching Assistant (TA) — **Sep. 2016 – Dec. 2020**
University of Tehran — *Tehran, Iran*

- Prepared and presented lectures, held discussion sessions, designed and graded assignments and exams
  - Application of Computers in Polymer Engineering (Ph.D.), Spring 2019
  - Advanced Polymerization Process Engineering (Master's), Fall 2018–20
  - Principles of Polymerization Engineering (Bachelor's), Fall 2017–19
  - Industrial Resins Engineering (Bachelor's), Fall 2016–17
- Supervised laboratory sessions and assisted in preparation and execution of experiments
  - General Chemistry Laboratory, spring 2018–19

Quality Control Laboratory Technician — **May 2016 – Aug. 2016**
Khosh Paint & Resin Company — *Tehran, Iran*

- B.Sc. internship: Conducted physical and chemical analyses on paint and resin products

SKILLS

Language

- Persian: **Native**
- Arabic: **Elementary**
- Spanish: **Intermediate**
- English: **Fluent**

Soft Skills

- Interdisciplinary Teamwork
- Self-directed Research
- Scientific Communication
- Mentoring & Teaching
- Adaptability & Flexibility
- Time Management

Computer

- **Software Applications**
  - Office: Word, Excel, PowerPoint, Visio
  - Design: Moldflow, Inventor, AutoCAD
  - Graphic: Blender, Photoshop, Illustrator
  - Others: Origin, ChemDraw, Mendeley, Aspen
- **Programming & Computing**
  - Languages: Python, MATLAB, LaTeX, Bash
  - HPC: Slurm, Linux clusters, parallel computing
- **Machine Learning**
  - Frameworks: TensorFlow, PyTorch, Scikit-learn
  - Deep Learning: Neural Networks, CNN, RNN, GAN
  - Other: Ensemble, Boosting, Reinforcement Learning

Technical

- Reaction Engineering
- Reaction Calorimetry
- Injection molding
- Extrusion process
- Mechanical testing (Tensile, Shear, Creep)
- Chromatography (GC, GPC, AF4)
- Thermal analysis (DSC, DMTA, TGA)
- Electron microscopy (SEM, TEM)
- Spectroscopy (NMR, FTIR)

HONORS & AWARDS

Master of Science Top Student, University of Tehran — **May 2019**
Ranked **1st** among all Polymer Engineering graduate students.

Scholarship, Ministry of Science, Research and Technology — **Aug. 2017**
Ranked within the top **1%** nationwide in the Graduate Entrance Exam in Polymer Engineering.

Bachelor of Science Top Student, University of Tehran — **Feb. 2017**
Ranked among the top **5** undergraduate students in Polymer Engineering.

Full tuition waiver, Ministry of Science, Research and Technology — **Aug. 2012**
Ranked within the top **1%** of ∼**230,000** participants in the Iranian University Entrance Exam.

SELECTED COURSES

Graduate

- Biocompatible Polymers: **19**/20
- Advanced Polymer Processing: **19.5**/20
- Polymer Blends: **18.25**/20
- Advanced Engineering Mathematics: **17.65**/20

Undergraduate

- Mass Transfer: **17.5**/20
- Fluid Mechanics: **16.5**/20
- Process Control: **16.5**/20
- Physical Chemistry: **17.25**/20
- Fibers Engineering: **17**/20
- Elastomers Engineering: **17.5**/20
- Polymers Characterization: **19.5**/20
- Polymer Reaction Engineering: **19**/20

ACADEMIC PROJECTS & ACTIVITIES

Plastic Injection Molding Simulation — **Spring 2018**
Simulated and optimized the plastic injection molding process using Autodesk Moldflow.

9th Conference on CFD in the Chemical and Petroleum Industry (CFD2018) — **Nov. 2018**
Served as an organizing committee member; supported technical operations in the control room.

3rd International Conference on Masterbatch and Polymer Compounds (MPC2018) — **Feb. 2018**
Contributed as a student committee member; assisted with scientific coordination and sessions.

Modeling of PVC Suspension Polymerization — **Fall 2017**
Developed a MATLAB model using the Method of Moments as a group project.

70th Anniversary of Chemical Engineering in Iran — **Nov. 2016**
Served as a member of the main organizing team; coordinated events and presentations.

12th International Conference on Membrane Science and Technology (MST2015) — **Dec. 2015**
Served as an organizing committee member; supported technical operations in the control room.

INTERESTS & HOBBIES

Attending cinema screenings, writing film critiques and reviews, photography and video editing, playing guitar, culinary exploration, hiking, traveling, and volunteering with Be My Eyes.

REFERENCES

Prof. Nicholas Ballard
Associate Professor
University of the Basque Country
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nicholas.ballard@polymat.eu
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Prof. José M. Asua
Full Professor and Coordinator
University of the Basque Country
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jm.asua@ehu.es
(+34) 943 018 181

Prof. Mohammad Najafi
Associate Professor
University of Tehran
Research Profile
najafi.m@ut.ac.ir
(+98) 21 61112195

PUBLICATIONS

[1] **Farajzadehahary**, **Kiarash**, Hamzehlou, Shaghayegh, Ballard, Nicholas. "Adding Machine Learning to the Polymer Reaction Engineering Toolbox". In: *Progress in Polymer Science* (2025), p. 102029.

[2] Naderi, Mehdi, **Farajzadehahary**, **Kiarash**, Melchin, Timo, Weitzel, Hans-Peter, Leiza, Jose R, Asua, José M. "Alkali-Soluble Resins as pH-Responsive Protective Colloids". In: *ACS Applied Materials & Interfaces* 17.30 (2025), pp. 43750–43760.

[3] Ballard, Nicholas, **Farajzadehahary**, **Kiarash**, Hamzehlou, Shaghayegh, Mori, Usue, Asua, José M. "Reinforcement learning for the optimization and online control of emulsion polymerization reactors: Particle morphology". In: *Computers & Chemical Engineering* 187 (2024), p. 108739.

[4] Ballard, Nicholas, Larrañaga, Jon, **Farajzadehahary**, **Kiarash**, Asua, José M. "Polymer chemistry informed neural networks (PCINNs) for data-driven modelling of polymerization processes". In: *Polymer Chemistry* 15.44 (2024), pp. 4580–4590.

[5] **Farajzadehahary**, **Kiarash**, Hamzehlou, Shaghayegh, Ballard, Nicholas, Asua, José M. "The hidden secrets of the average number of radicals per particle ($\bar{n}$) and their implications in control of emulsion polymerization reactors". In: *Chemical Engineering Journal* 487 (2024), p. 150681.

[6] **Farajzadehahary**, **Kiarash**, Telleria-Allika, Xabier, Asua, José M, Ballard, Nicholas. "An artificial neural network to predict reactivity ratios in radical copolymerization". In: *Polymer Chemistry* 14.23 (2023), pp. 2779–2787.

CONFERENCES

[1] **Farajzadehahary**, **Kiarash**. "Machine Learning Approaches for the Modeling and Control of Complex Polymerization Processes". In: *European Polymer Congress 2025 (EPF 2025)*. Oral presentation. Groningen, Netherlands, June 2025.

[2] **Farajzadehahary**, **Kiarash**. "Polymer Chemistry Informed Neural Networks for Modeling of Polymerization Reactions". In: *13th PhD-Workshop on Polymer Reaction Engineering (WPPRE 2025)*. Oral presentation. Prague, Czech Republic, May 2025.

[3] **Farajzadehahary**, **Kiarash**. "Machine learning models for predicting key properties in free radical emulsion polymerization". In: *Artificial Intelligence for Advanced Materials (AI4AM2025)*. Conference Poster. San Sebastián - Donostia, Spain, Apr. 2025.

[4] **Farajzadehahary**, **Kiarash**. "Navigating Polymerization Complexity with Artificial Intelligence: A New Era of MWD Control and Optimization". In: *12th PhD-Workshop on Polymer Reaction Engineering (WPPRE 2024)*. Oral presentation. Lyon, France, Oct. 2024.

[5] **Farajzadehahary**, **Kiarash**. "Using reinforcement learning to control and optimize emulsion polymerization reactors". In: *24th meeting of Industrial Liaison Program (ILP 2024)*. Oral presentation. San Sebastián, Spain, Sept. 2024.

[6] **Farajzadehahary**, **Kiarash**. "Using machine learning to predict reactivity ratios in radical polymerization". In: *23rd meeting of Industrial Liaison Program (ILP 2023)*. Oral presentation. San Sebastián, Spain, Oct. 2023.

PEER REVIEWS

[1] *Chemical engineering journal*. In: (Feb. 2026). Elsevier B.V., ISSN: 1385-8947.

[2] *Digital Discovery*. In: (Oct. 2025). Royal Society of Chemistry, ISSN: 2635-098X.

[3] *Nanoscale*. In: (May 2024). Royal Society of Chemistry, ISSN: 2040-3372.