Gabriel D. Patrón

Citizenship: Canadian, Colombian
Languages: English, Spanish

Department of Computing, Imperial College London
302 Huxley Building, 180 Queen's Gate, South Kensington, London, UK, SW7 2AZ
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Professional Appointments

University of Toronto, Department of Chemical Engineering & Applied Chemistry — Toronto, CA
Assistant Professor of Chemical Engineering — *Starting August 2026*

Imperial College London, Department of Computing, Sargent Centre for Process Systems Engineering — London, UK
Research Associate — *2024–2026*
Advisors: Calvin Tsay (Computing) and Nilay Shah (Chemical Engineering)

University of Waterloo, Department of Chemical Engineering — Waterloo, CA
Postdoctoral Fellow — *2023–2024*
Advisor: Luis Ricardez-Sandoval

National University of Singapore, Department of Chemical and Biomolecular Engineering — Singapore, SG
Research Assistant — *2016*
Advisor: Ning YAN

Education

University of Waterloo, Department of Chemical Engineering — Waterloo, CA
PhD, Chemical Engineering — *2019–2023*
Supervisor: Luis Ricardez-Sandoval
Thesis: "New approaches for the real-time optimization of process systems under uncertainty"

Imperial College London, Department of Chemical Engineering — London, UK
MSc, Chemical Engineering — *2017–2018*
Supervisor: Amparo Galindo
Thesis: "*An Application of Residual Entropy Scaling to Calculate and Predict Viscosity Using the SAFT-γ Mie Equation of State*"

University of Waterloo, Department of Chemical Engineering — Toronto, CA
BASc, Chemical Engineering — *2013–2017*
Thesis: "*Formic Acid-Mediated Pyrolysis of Woody Biomass*"

Peer-Reviewed Journal Publications

*=co-first authors

[J10] **Patrón, G.D.,** Tsay, C., Ricardez-Sandoval, L, 2025. Deep-learning-aided modifier adaptation: synergies with process intensification. Chemical Engineering and Processing – Process Intensification 219, 110581.

[J09] Ghilardi, L.M.P., **Patrón, G.D.,** Alcántara, A., Tsay, C, 2025. Integrated design and scheduling of hydrogen processes under uncertainty: a quantile neural network approach. Industrial & Engineering Chemistry Research.

[J08] Stordy, B.P.*, Sepahi, Z.*, **Patrón, G.D.,** Yang, W., Goodson, A.D., Blackadar, C., Tavares, A.J., Lin, G., Malekjahani, A., Ling, B., Ravichandran, R., Hicks, D.R., Shapiro, M.G. Zhang, M., King, N.P., Baker, D., Ricardez-Sandoval, L.A., Chan, W.C.W., 2025. The Binding Affinities of Serum Proteins to Nanoparticles. Journal of the American Chemical Society 147(24), 20475–20492.

[J07] **Patrón, G.D.,** Ricardez-Sandoval, L., 2024. Economically optimal operation of recirculating aquaculture systems under uncertainty. Computers and Electronics in Agriculture 220, 108856.

[J06] **Patrón, G.D.,** Toffolo, K., Ricardez-Sandoval, L., 2024. Economic model predictive control for packed bed chemical looping combustion. Chemical Engineering and Processing – Process Intensification 198, 109731.

[J05] **Patrón, G.D.,** Ricardez-Sandoval, L., 2023. Robust real-time optimization and parameter estimation of post-combustion CO_2 capture under economic uncertainty. Chemical Engineering Science 281, 119124.

[J04] **Patrón, G.D.,** Ricardez-Sandoval, L., 2023. Directional modifier adaptation based on input selection for real-time optimization. Computers & Chemical Engineering 177, 108351.

[J03] **Patrón, G.D.,** Ricardez-Sandoval, L., 2022. Low-Variance Parameter Estimation Approach for Real-Time Optimization of Noisy Process Systems. Industrial & Engineering Chemistry Research 61(45), 16780–16798.

[J02] **Patrón, G.D.,** Ricardez-Sandoval, L., 2022. An integrated real-time optimization, control, and estimation scheme for post-combustion CO_2 capture. Applied Energy 308, 118302.

[J01] **Patrón, G.D.,** Ricardez-Sandoval, L., 2020. A robust nonlinear model predictive controller for a post-combustion CO_2 capture absorber unit. Fuel 265, 116932.

Preprints

[PP02] Langdon, B., **Patrón, G.D.,** Kappatou, C.D., Lee, R.M., Shafei, B., Qing, J., Misener, R., van der Wilk, M., Tsay, C. Meta-Learning for Sample-Efficient Bayesian Optimisation of Fed-Batch Processes. arXiv:2605.05382.

[PP01] **Patrón, G.D.,** Zhang, D., Ghilardi, L.M.P., Blom, E., Goodridge, M., Solis, E., Hamidreza, J., Angarita, J., Ganesan, N., West, K., Shah, N., Tsay, C. Risk-constrained stochastic scheduling of multi-market energy storage systems. arXiv:2510.27528.

Peer-Reviewed Conference Proceedings

[C05, forthcoming] **Patrón, G.D.,** Ganesan, N., Shah, N., Tsay, C. Learnable Decision Trees for Interpretable Energy Arbitrage Scheduling. IFAC-PapersOnLine

[C04, forthcoming] Wang, H., **Patrón, G.D.,** Bo. C, Ricardez-Sandoval, L. Modeling and real-time optimization of an industrial residue oil hydrotreating unit. IFAC-PapersOnLine.

[C03] **Patrón, G.D.,** Ricardez-Sandoval, L., 2024. Bootstrapped gross error detection for efficient and fault-tolerant real-time optimization. American Control Conference, 1720–1725.

[C02] **Patrón, G.D.,** Ricardez-Sandoval, L., 2023. Economic Model Predictive Control of a Recirculating Aquaculture System. IFAC-PapersOnLine 56(2); 6156–6161.

[C01] **Patrón, G.D.,** Ricardez-Sandoval, L., 2020. Real-Time Optimization and Nonlinear Model Predictive Control for a Post-Combustion Carbon Capture Absorber. IFAC-PapersOnLine 53(2), 11595–11600.

Book Chapters

[B02, forthcoming] Ronson, D., Ali, O., **Patrón, G.D.,** Ricardez-Sandoval, L., 2026. Advances in Chemical Looping Combustion: Process Integration, Design, and Operations Management. Process Intensification for Cabon Capture and Utilization, Elsevier.

[B01] **Patrón, G.D.,** Ricardez-Sandoval, L., 2026. Online control and optimization for conventional and emerging carbon capture systems. Encyclopedia of Systems of Systems and Control Engineering 4, 204–222, Elsevier.

Oral Presentations (Without Proceedings)

[P08] **Patrón, G.D.,** Shah, N., Tsay, C. (2025). Risk-Constrained Two-Stage Demand Response Scheduling for Green Hydrogen Production. AIChE annual meeting 2025, 710e.

[P07] **Patrón, G.D.,** Tsay, C., Ricardez-Sandoval, L. (2025). Deep-Learning-Aided Modifier Adaptation for Real-Time Optimization. AIChE annual meeting 2025, 644e.

[P06] **Patrón, G.D.,** Shah, N., Tsay, C. (2025). Risk-constrained two-stage demand response scheduling for green hydrogen production. 22nd European Conference on Advances in Continuous Optimization.

[P05] **Patrón, G.D.,** Shah, N., Tsay, C. (2025). Stochastic Optimization for Demand Response Scheduling of Green Hydrogen Production. 18th INFORMS Computing Society (ICS) Conference.

[P04] **Patrón, G.D.,** Ricardez-Sandoval, L. (2023). Robust real-time optimization for the long-term economical and sustainable operation of post-combustion carbon capture under uncertainty. 11th International Freiberg Conference, Poster 25.

[P03] **Patrón, G.D.,** Ricardez-Sandoval, L. (2022). Partial Modifier Adaptation for Economic Optimization of Process Systems Under Frequent Disturbances and Structural Model Uncertainty. AIChE annual meeting 2022, 434d.

[P02] **Patrón, G.D.,** Ricardez-Sandoval, L. (2022). Parameter Estimation for Real-Time Optimization Under Model Uncertainty and Measurement Noise. AIChE annual meeting 2022, 434g.

[P01] **Patrón, G.D.,** Ricardez-Sandoval, L. (2020). Towards an integrated approach for real-time economic optimization, state estimation, and control for a post-combustion carbon capture absorber section. AIChE annual meeting 2020, 596c.

Awards and Grants

FIPSE-7 Emerging Star *2026*
Doctoral Thesis Completion Award ($CAD 5,000) | **University of Waterloo** *2023*
Faculty of Engineering Domestic Doctoral Student Award ($CAD 28,500 total) | **University of Waterloo** *2018–2022*
Waterloo Graduate Research Scholarship ($CAD 68,500 total) | **University of Waterloo** *2018–2022*
Dean's List | **University of Toronto** *2013–2017*
Centre for International Experience Award ($CAD 1,000) | **University of Toronto** *2016*
Cross-Disciplinary Program Summer Grant ($CAD 2,000) | **University of Toronto** *2016*
University of Toronto Entrance Scholarship ($CAD 2,000) | **University of Toronto** *2013*

Teaching and Mentoring

Graduate teaching
Imperial Business School London, UK
TA for MSc in Business Analytics: Deep Learning and Generative AI with Dr. Calvin Tsay *2025*

Graduate student supervision
Imperial College London, Department of Computing London, UK
PhD candidate, Becky Langdon: *"System-aware neural ODE processes for the optimisation of batch processes"* *2024–*
University of Waterloo, Department of Chemical Engineering Waterloo, CA
MASc candidate, Dana Ronson: *"Modelling of chemical looping combustion with red mud oxygen carrier"* *2023–*

Undergraduate teaching
University of Waterloo, Department of Chemical Engineering Waterloo, CA
TA for CHE420: Introduction to Process Control with Prof. Hector Budman *2019, 2020*

Undergraduate student supervision
University of Waterloo, Department of Chemical Engineering Waterloo, CA
Zhen Ye: *"Modifier adaptation for real-time optimization of the Williams-Otto CSTR"* *2022*
Final year project: *"Design of a Chemical Looping Combustion Model for Reducing Carbon Footprint"* *2021*
Final year project: *"Modelling and Optimization of Chemical Looping Combustion (CLC) Process"* *2020*

Professional Membership

American Institute of Chemical Engineers (AIChE): Post-doctoral Researcher Member *2022–*
Canadian Society for Chemical Engineering (CSChE): Postdoctoral Fellow Member *2022–*
International Federation of Automatic Control (IFAC): Affiliate Member *2022–*

Academic Service

Journal reviewer: AIChE Journal, Applied Intelligence, The Canadian Journal of Chemical Engineering, Computers and Electronic in Agriculture, Digital Chemical Engineering, Engineering Applications of Artificial Intelligence, Industrial & Engineering Chemistry Research, Journal of Process Control.
Conference reviewer: American Controls Conference (ACC), Dynamics and Control of Process Systems (DYCOPS).
Conference session organizer: 22nd Conference on Advances in Continuous Optimization.

Industrial Experience

EllisDon Corporation *2015*

M.E.I.T. Intern, New Oakville Trafalgar Memorial Hospital

- Worked with specialty teams - Mechanical, Electrical, and Information Technology - during the commissioning of the project.
- Performed calibration, testing, and troubleshooting for hospital communications and emergency systems - to meet strict hospital regulations and standards.
- Identified system deficiencies and liaised with subcontractors to find solutions.
- Modified drawings for hoarding permit applications using Autodesk.

EllisDon Corporation *2014*

Estimating Intern

- Was a part of the proposal team that formed an estimate and won the Eglinton Light Rail Transit (ELRT) project.
- Management of several project-specific tender packages, including assessment of requirements based on specifications, qualification process, management of quotes, quantity takeoffs, and estimates.