# Can Li

Assistant Professor
Davidson School of Chemical Engineering, Purdue University
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## EDUCATION

**Carnegie Mellon University** *August 2016-May 2021*
Ph.D. in Chemical Engineering

- Research advisor: Prof. Ignacio E. Grossmann
- Thesis: Algorithms for Stochastic Mixed-Integer Nonlinear Programming and Long Term Optimization of Electric Power Systems

**Tsinghua University** *August 2012-July 2016*
B.Eng. in Chemical Engineering

- Research advisor: Prof. Yushan Zhu, Prof. Chu Wang
- Thesis: Sequence-Based Prediction of Cysteine Reactivity Using Machine Learning

**University of Wisconsin, Madison** *August 2014-December 2014*
Exchange Student, Department of Chemical and Biological Engineering

## APPOINTMENTS

**Davidson School of Chemical Engineering, Purdue University, IN** *June 2022-*
*Assistant Professor*

Research expertise: Stochastic Programming; Mixed-Integer Programming; Energy Systems

**Polytechnique Montreal** *June 2021-June 2022*
*Post-doctoral Researcher, Department of Mathematics and Industrial Engineering Advisor: Prof. Andrea Lodi*

- Develop machine learning methods for global optimization problems
- Develop first-order methods for solving semidefinite programming problems

**Argonne National Laboratory, Lemont, IL** *May 2020-August 2020*
*Givens Associate at Mathematics and Computer Science Division Supervisor: Dr. Kibaek Kim*

· Decision rule-based algorithm for two-stage stochastic programs

**ExxonMobil Upstream Research Company, Spring, TX** *May 2018-August 2018*
*Research intern in Decision Support and Optimization team Supervisor: Dr. Kevin Furman*

· Feasibility detector for LNG ship scheduling problems

## RESEARCH EXPERIENCE

**Carnegie Mellon University** *November 2016-May 2021*
*Research Assistant Advisor: Prof. Ignacio E. Grossmann*

- Decision-making under uncertainty: several new algorithms and software packages for solving stochastic mixed-integer nonlinear programming problems that are intractable by commercial solvers

- Energy systems: power systems infrastructure planning with high renewables penetration, shale gas development planning under uncertainty in natural gas price that leads to millions of dollar savings
- Data-driven methods: a deep reinforcement learning approach for chemical production scheduling

**Peking University** *October 2015-July 2016*
*Independent Researcher* *Advisor: Prof. Chu Wang*
- Gathered mass spectrometry data reflecting functional cysteine reactivity in proteomes.
- Developed a novel sequence-based feature-selection tool and a machine learning-based algorithm, sbPCR, for cysteine reactivity prediction

**University of Washington, Seattle** *July 2015-September 2015*
*Student Intern* *Advisor: Prof. David Baker*
- Computational protein design: used in-house software for *de novo* design of protein fibers
- Experimental work: expressed desired designs in *E.coli* and characterized them using experimental methods, such as Transmission Electron Microscopy (TEM) and mass spectrometry.

**University of Wisconsin, Madison** *August 2014-December 2014*
*Independent Researcher* *Advisor: Prof. Christos T. Maravelias*
- Chemical production scheduling: built three new continuous-time models for scheduling multistage batch process under utility constraints

## TEACHING EXPERIENCE

**Purdue University, Davidson School of Chemical Engineering** *August 2022-present*
*Course Instructor*
- Course: Statistical Modeling and Quality Enhancement

**CMU, Department of Chemical Engineering** *January 2017-present*
*Teaching Assistant*
- Designed and gave guest lectures, held office hours, designed and graded assignments and projects, instructed and supervised students in project work, lead student group discussions
- Courses: Chemical Process Systems Design, Process Systems Modeling, Advanced Process Systems Engineering

**CMU, Eberly Center for Teaching Excellence & Educational Innovation** *September 2019-present*
*Future Faculty Program*
- Participated in seminars to improve teaching and communication skills
- Obtained feedback from experts through two teaching observations

## RESEARCH MENTORING

**Kaiyu Cao, Postdoctoral Researcher at Purdue ChemE** *August 2022-present*
- Project title: Multiscale algorithms

**Chi Zhang, Postdoctoral Researcher at Purdue ChemE** *August 2022-present*
- Project title: End-to-end machine learning

**Asha Ramanujam, PhD student at Purdue ChemE** *November 2021-present*
- Project title: Stochastic Programming for Electrification

**Haoyue Liang, Undergraduate student from CMU ChemE** *September 2018-August 2019*
- Jointly supervised with Prof. Ignacio Grossmann

- Project title: Stochastic Mixed-integer Nonlinear Programming Libraries

**Hyukjae Kwark, Undergraduate student from CMU ChemE** *September 2018-August 2019*
- Jointly supervised with Prof. Ignacio Grossmann
- Project title: Stochastic Mixed-integer Nonlinear Programming Libraries

**Zedong Peng, Visiting PhD student from Zhejiang University** *August 2019-August 2020*
- Jointly supervised with Prof. Ignacio Grossmann in collaboration with SK Innovation
- Project title: Multi-period Design and Planning Model of Shale Gas Field Development

**Yue Sha, Visiting PhD student from Tsinghua University** *January 2019-July 2019*
- Jointly supervised with Prof. Ignacio Grossmann
- Project title: Integrated Scheduling and Procurement under Endogenous Uncertainty using Stochastic Programming

**Nikhil Eti, Master student from CMU ChemE** *August 2019-June 2020*
- Jointly supervised with Prof. Ignacio Grossmann in collaboration with SK Innovation
- Project title: Multi-period Design and Planning Model of Shale Gas Field Development

**Divyam Mandalia, Master student from CMU ChemE** *January 2019- December 2019*
- Jointly supervised with Prof. Ignacio Grossmann in collaboration with Total
- Project title: Integration of reservoir modeling with oilfield planning and infrastructure optimization

## CONFERENCE PRESENTATIONS

[1] **Can Li**, Kibaek Kim (2022) Piecewise Linear Decision Rules via Adaptive Partition for Two Stage Stochastic Mixed Integer Linear Programs. ICCOPT

[2] **Can Li**, Antonio J. Conejo, Peng Liu, Benjamin P. Omell, John D. Siirola, Ignacio E. Grossmann (2021) Mixed-integer Linear Programming Models And Algorithms For Generation And Transmission Expansion Planning Of Power Systems. INFORMS Annual Meeting

[3] **Can Li**, Antonio J. Conejo, John D. Siirola, Ignacio E. Grossmann (2021) On representative day selection for capacity expansion planning of power systems under extreme events. AIChE Annual Meeting, Boston.

[4] **Can Li**, Antonio J. Conejo, Peng Liu, Benjamin P. Omell, John D. Siirola, Ignacio E. Grossmann (2020) Power Systems Infrastructure Planning with High Renewables Penetration. AIChE Annual Meeting, San Francisco.

[5] **Can Li**, David E. Bernal, Kevin C. Furman, Marco A. Duran, Ignacio E. Grossmann (2020) Sample Average Approximation for Stochastic Nonconvex Mixed Integer Nonlinear Programming via Outer-Approximation. AIChE Annual Meeting, San Francisco.

[6] **Can Li**, David E. Bernal, Kevin C. Furman, Marco A. Duran, Ignacio E. Grossmann (2020) Sample Average Approximation for Stochastic Nonconvex Mixed Integer Nonlinear Programming via Outer-Approximation. INFORMS Annual Meeting.

[7] **Can Li**, Ignacio E. Grossmann (2019). A finite $\epsilon$-convergence algorithm for two-stage stochastic convex nonlinear programs with mixed-binary first and second stage variables. XV ICSP conference, Trondheim.

[8] **Can Li**, Ignacio E. Grossmann (2019). On Solving Nonconvex Two-stage Stochastic Programs With Generalized Benders Decomposition. INFORMS Annual Meeting, Seattle.

[9] **Can Li**, Ignacio E. Grossmann, John P. Eason, Markus G. Drouven (2019). Single Pad Planning Under Uncertainty for Shale Gas Development. AIChE Annual Meeting, Orlando.

[10] **Can Li**, Ignacio E. Grossmann (2018). On Solving Nonconvex Two-stage Stochastic Programs with Generalized Benders Decomposition. AIChE Annual Meeting, Pittsburgh.

[11] **Can Li**, Ignacio E. Grossmann (2018). A finite $\epsilon$-convergence algorithm for two-stage convex 0-1 mixed-integer nonlinear stochastic programs with mixed-integer first and second stage variables. INFORMS Annual Meeting, Phoenix.

[12] **Can Li**, Ignacio E. Grossmann (2018). An Improved L-shaped Method for Two-stage Convex 0-1 Mixed Integer Nonlinear Stochastic Programs. PSE 2018, San Diego.

## INVITED SEMINAR

[1] Can Li (2022). LANS seminar at Argonne National Laboratory. Invited by Dr. Kibaek Kim

[2] Can Li (2022). Algorithms and Software for Two-stage Stochastic Mixed-integer Nonlinear Programs. Group meeting at Imperial College London and Manchester University. Invited by Prof. Antonio Del Rio Chanona and Prof. Dongda Zhang

[3] Can Li (2022). Algorithms and Software for Two-stage Stochastic Mixed-integer Nonlinear Programs. Coffee talk at Polytechnique Montreal. Invited by Prof. Andrea Lodi

[4] Can Li (2021). Decision-making under uncertainty through mathematical programming: Optimization of sustainable energy systems design and operation. Davidson School of Chemical Engineering, Purdue University.

[5] Can Li (2021). Algorithms and Software for Two-stage Stochastic Mixed-integer Nonlinear Programs. Los Alamos National Laboratory, invited by Dr. Harsha Nagarajan

[6] Can Li (2018). On Solving Stochastic Mixed-integer Nonlinear Programs. Department of Chemical Engineering, Tsinghua University, invited by Prof. Yushan Zhu

## HONORS AND AWARDS

- CAST Division Student Presentation Award, 3rd place, 2021
- Honorable mention award, 42nd Annual CHEGSA Symposium, Carnegie Mellon University, 2020
- Best Poster Award, Center for Advanced Process Decision-making (CAPD) annual meeting, 2018
- Jinyong Award, Department of Chemical Engineering, Tsinghua University, 2015
- CSC Scholarship, Exchange Student at UW-Madison, 2014
- Lijieshen Award, Department of Chemical Engineering, Tsinghua University, 2014
- Second Prize, Physics Olympiad for Undergraduates in Beijing, 2014
- Member, Spark Talents Program for Technological Innovation, Tsinghua University, 2014
- Comprehensive Excellent Scholarship (3/116 in Department of Chemical Engineering), Tsinghua University, 2013
- First Prize (1st of Henan Province), National Olympiad in Chemistry, 2011

## REVIEW SERVICE

- Optimization and Engineering
- Computers & Chemical Engineering
- Journal of Global Optimization
- SIAM Journal on Optimization
- Mathematical Programming
- INFORMS Journal on Computing
- International Journal of Electrical Power and Energy Systems
- Computers and Electrical Engineering
- SN Operations Research Forum
- AIChE Journal
- IEEE Transactions on Control Systems Technology
- ACS Sustainable Chemistry & Engineering
- Transportation Research Part E
- Networks and Spatial Economics

## CONFERENCE ORGANIZATION

- Session Chair, ICCOPT, 2022
- Session Chair, INFORMS Annual Meeting, 2021
- Cluster Chair, INFORMS Annual Meeting, 2020
- Session Chair, INFORMS Annual Meeting, 2020
- Session Chair, XV ICSP conference, Trondheim, 2019.

## PUBLICATIONS


[1] Cho, S., Li, C., Grossmann, I. E. (2022). Recent advances and challenges in optimization models for expansion planning of power systems and reliability optimization. Computers & Chemical Engineering, 107924.

[2] Chang, Y., Syahirah, R., Wang, X., Jin, G., Torregrosa-Allen, S., Elzey, B. D., ... Bao, X. (2022). Engineering chimeric antigen receptor neutrophils from human pluripotent stem cells for targeted cancer immunotherapy. Cell reports, 40(3), 111128.

[3] Torres, J. J., Li, C., Apap, R. M., Grossmann, I. E. (2022). A Review on the Performance of Linear and Mixed Integer Two-Stage Stochastic Programming Software. Algorithms, 15(4), 103.

[4] Li, C., Conejo, A. J., Siirola, J. D., & Grossmann, I. E. (2021). On representative day selection for capacity expansion planning of power systems under extreme operating conditions. International Journal of Electrical Power Energy Systems, 107697.

[5] Peng, Z., Li, C., Grossmann, I. E., Kwon, K., Ko, S., Shin, J., & Feng, Y. (2021). Shale gas field development planning under production profile uncertainty. AIChE Journal, e17439.

[6] Peng, Z., Li, C., Grossmann, I. E., Kwon, K., Ko, S., Shin, J., & Feng, Y. (2021). Multiperiod design and planning model of shale gas field development. AIChE Journal, 67(8), e17195.

[7] Li, C., Conejo, A. J., Liu, P., Omell, B. P., Siirola, J. D., & Grossmann, I. E. (2021). Mixed-integer linear programming models and algorithms for generation and transmission expansion planning of power systems. European Journal of Operational Research.

[8] Li, C., & Grossmann, I. E. (2021). A review of stochastic programming methods for optimization of process systems under uncertainty. Front. Chem. Eng, 2, 1-20.

[9] Perez, H. D., Hubbs, C. D., Li, C., & Grossmann, I. E. (2021). Algorithmic Approaches to Inventory Management Optimization. Processes, 9(1), 102.

[10] Li, C., Bernal, D.E., Furman, K.C., Duran, M.A. and Grossmann, I.E., 2020. Sample average approximation for stochastic nonconvex mixed integer nonlinear programming via outer-approximation. Optimization and Engineering, pp.1-29.

[11] Hubbs, C.D., Li, C., Sahinidis, N.V., Grossmann, I.E. and Wassick, J.M., 2020. A Deep Reinforcement Learning Approach for Chemical Production Scheduling. Computers & Chemical Engineering, p.106982.

[12] Li, C., Eason, J.P., Drouven, M.G. and Grossmann, I.E., 2020. Shale gas pad development planning under price uncertainty. AIChE Journal, 66(6), p.e16933.

[13] Li, C. and Grossmann, I.E., 2019. A generalized Benders decomposition-based branch and cut algorithm for two-stage stochastic programs with nonconvex constraints and mixed-binary first and second stage variables. Journal of Global Optimization, 75(2), pp.247-272.

[14] Li, C. and Grossmann, I.E., 2019. A finite $\epsilon$-convergence algorithm for two-stage stochastic convex nonlinear programs with mixed-binary first and second-stage variables. Journal of Global Optimization, 75(4), pp.921-947.

[15] Lara, C.L., Bernal, D.E., Li, C. and Grossmann, I.E., 2019. Global optimization algorithm for multi-period design and planning of centralized and distributed manufacturing networks. Computers & Chemical Engineering, 127, pp.295-310.

[16] Li, C. and Grossmann, I.E., 2018. An improved L-shaped method for two-stage convex 0-1 mixed integer nonlinear stochastic programs. Computers & Chemical Engineering, 112, pp.165-179.

[17] Wang, H.*, Chen, X.*, Li, C.*, Liu, Y., Yang, F. and Wang, C., 2018. Sequence-based prediction of cysteine reactivity using machine learning. Biochemistry, 57(4), pp.451-460.

* = Co-1st-Author