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Engineering & Scientific Consulting

Achim Wechsung, Ph.D., P.E., CFEI

Senior Engineer | Thermal Sciences
1075 Worcester St. | Natick, MA 01760
(508) 652-8573 tel | awechsung@exponent.com

Professional Profile

Dr. Wechsung is a chemical engineer in Exponent's Thermal Sciences practice consulting primarily in the areas of hydrogen, petrochemical, chemical and industrial processing, oil and gas, process safety, risk analysis, fire and explosions, and advanced modeling. Dr. Wechsung has investigated incidents at petroleum refineries, chemical and industrial processing plants as well as fires and explosions at residential and industrial sites. He has also evaluated infringement and validity of patents for petroleum technologies and performed dust hazard analyses (DHA) for manufacturers handling combustible organic and metal dusts.

Dr. Wechsung is experienced in modeling, simulating and optimizing industrial processes and process networks. He has held key roles in multiple industrial process development projects, including methane pyrolysis for sustainable hydrogen production with a reduced carbon footprint, and has conducted thorough risk assessments. He has successfully supported pilot plant operations for process scale-up and has worked closely with major multinational engineering companies to bring new technologies to the market. Additionally, he has advised senior management on the impact and mitigation of incidents affecting chemical production sites. He understands the value contained in industrial data sets and is experienced in analyzing these with state-of-the-art methods to draw actionable conclusions.

Prior to joining Exponent, Dr. Wechsung worked in multiple roles for BASF, one of the world's largest chemical companies. At BASF he developed new chemical processes, led research project teams, advanced digital capabilities and supported the world's largest integrated chemical complex in Ludwigshafen, Germany, a site with more than one hundred plants. Previously, he conducted his Ph.D. research at Massachusetts Institute of Technology (MIT) in the Department of Chemical Engineering. His research focused on developing cutting-edge numerical methods for optimization of nonlinear models and their application in case studies taken from liquefied natural gas (LNG) processing and coal combustion.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, Massachusetts Institute of Technology (MIT), 2014

Dipl.-Ing., Mechanical Engineering, RWTH Aachen University, Germany, 2008

Licenses and Certifications

Licensed Professional Chemical Engineer, California, #7005

Certified Fire and Explosion Investigator (CFEI) in accordance with the National Association of Fire Investigators National Certification Board per NFPA 921 Section 14.6.5

Prior Experience

BASF SE, 2013-2019

Professional Affiliations

American Institute of Chemical Engineers (Senior Member, AIChE)

National Association of Fire Investigators (NAFI)

National Fire Protection Association (NFPA)

- Principal Member of the Committee on Hydrogen Technology responsible for NFPA 2 Hydrogen Technologies Code

- Alternate Member of the Committee on Classification and Properties of Hazardous Chemical Data responsible for NFPA 704 Standard System for the Identification of the Hazards of Materials for Emergency Response CIGRE

- Member of Joint Working Group C5/C1.35 Integration of hydrogen in electricity markets and sector regulation

CSA Group

- Member of the Fuel Cell Technical Committee

- Member of the Hydrogen Generators – Fuel Processing Technical Subcommittee

- Member of the Stationary Fuel Cell Power Systems Technical Subcommittee

Verein deutscher Ingenieure (VDI)

Languages

German

Publications

Stern MC, Orella MJ, Wechsung A, Buehler CS. Carbon capture vs lithium ion batteries – which pairs better with renewable electricity? Proceedings, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

Stern MC, James JN, Morrison AM, Wechsung A, Buehler CS. Carbonomics: introduction to carbon pricing, regulations, and frameworks. Proceedings, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

Stern MC, James J, Morrison AM, Wechsung A, Buehler CS. Life cycle assessments: corporate value or potential risk lies in the details. Proceedings, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

Wechsung A, Buehler CS. What did i actually buy—guarantees of origin for hydrogen. Proceedings, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

Wechsung A, Watson HAJ, Scott JK, Barton PI. Reverse propagation of McCormick relaxations. Journal

of Global Optimization, 2015; 63: 1-36.

Stuber MD, Wechsung A, Sundaramoorthy A, Barton PI. Worst-case design of subsea production facilities using semi-infinite programming. *AIChE Journal*, 2014; 60:2413-2524.

Wechsung A, Barton PI. Global optimization of bounded factorable functions with discontinuities. *Journal of Global Optimization*, 2014; 58: 1-30.

Wechsung A, Schaber SD, Barton PI. The cluster problem revisited. *Journal of Global Optimization*, 2013; 58: 429-438.

Wechsung A, Aspelund A, Gundersen T, Barton PI. Synthesis of heat exchanger networks at subambient conditions with compression and expansion of process streams. *AIChE Journal*, 2011; 57: 2090-2108.

Wechsung A, Oldenburg J, Yu J, Polt A. Supporting chemical process design under uncertainty. *Brazilian Journal of Chemical Engineering*, 2010; 27: 451-460.

Presentations

Stern MC, Orella MJ, Wechsung A, Buehler CS. Carbon capture vs lithium ion batteries – which pairs better with renewable electricity? Oral presentation, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

Stern MC, James J, Morrison AM, Wechsung A, Buehler CS. Carbonomics: introduction to carbon pricing, regulations, and frameworks. Oral presentation, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

Stern MC, James J, Morrison AM, Wechsung A, Buehler CS. Life cycle assessments: corporate value or potential risk lies in the details. Oral presentation, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

Wechsung A, Buehler CS. What did i actually buy—guarantees of origin for hydrogen. Oral presentation, AIChE Spring Meeting & 18th Global Congress on Process Safety, San Antonio, TX, 2022.

White CC, Streifel BC, Wechsung A, Myers TJ. Understanding the pathways for residual PFAS during fluoropolymer processing. Oral presentation, ACS Spring Meeting, San Diego, CA, 2022.

Wechsung A, Orella MJ, Stern MC, Kytomaa HK, Green hydrogen – removing hurdles and creating the right incentives to make it viable. Oral presentation, AIChE Annual Meeting, 2021.

Orella MJ, Wechsung A, Stern MC, Kytomaa HK, An electrofuel revolution: how direct carbon reduction can electrify the future. Oral presentation, AIChE Annual Meeting, 2021.

Sulmonetti TP, Buehler CS, Wechsung A, Dee SJ. Transitioning from one explosive fuel to the next - safety considerations in the emerging hydrogen economy. Poster presentation, AIChE Spring Meeting & 17th Global Congress on Process Safety, 2021.

Watson HAJ, Wechsung A. Use of nonsmooth models and generalized derivatives to improve the robustness of process simulations. Oral presentation, AIChE Spring Meeting & 16th Global Congress on Process Safety, 2020.

Bode A, Castro-Arce J, Heid B, Henschel C, Wechsung A, Wojcicka J. Process Technology Licensing: An Interface of Engineering and Business. Oral presentation, 12th International Symposium on Process Systems Engineering and 25th European Symposium on Computer Aided Process Engineering, Copenhagen, Denmark, 2015.

Wechsung A, Kellenbenz J, Klingler D, Bode A. R&D at BASF: Developing a more sustainable route to hydrogen and syngas. Invited oral presentation, AVT Kolloquium, Aachen, Germany, 2014.

Wechsung A, Barton PI. On-line modeling of NO_x formation in a coal boiler. Poster presentation, European Symposium on Computer Aided Process Engineering, Lappeenranta, Finland, 2013.

Wechsung A, Barton PI. Improving relaxations of implicit functions. Oral presentation. International Symposium on Mathematical Programming, Berlin, Germany, 2012.

Wechsung A, Barton PI. Convex, continuous relaxations of discontinuous factorable functions. Oral presentation, INFORMS Annual Meeting, Charlotte, NC, 2011.

Wechsung A, Barton PI. Design of a self-supporting natural gas liquefaction process for accessing stranded off-shore resources. Oral presentation. AIChE Annual Meeting, Minneapolis, MN, 2011.

Wechsung A, Barton PI. Relaxations of bounded factorable functions with discontinuities. Oral presentation. 2nd World Congress on Global Optimization, Chania, Greece, 2011.

Wechsung A, Barton PI. Global optimization of discontinuous functions. Oral presentation. AIChE Annual Meeting, Salt Lake City, UT, 2010.

Wechsung A, Oldenburg J, Yu J, Polt A. Supporting chemical process design under uncertainty. Poster presentation. 10th International Symposium on Process Systems Engineering, Salvador, Brazil, 2009.