



Exponent[®]
Engineering & Scientific Consulting

Isaac Mastalski, Ph.D.

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Professional Profile

Dr. Mastalski applies chemical engineering fundamentals to provide technical consulting to clients and to investigate performance and failures in a variety of applications. His primary areas of expertise include chemical reactor design, reaction kinetics, plastics, pyrolysis, alternative energy, and catalysis. His main goal is to help clients successfully understand and address risks associated with accidents, losses, and injuries.

As a doctoral student in Chemical Engineering at the University of Minnesota, Dr. Mastalski performed research on pyrolytic methods for recycling plastics and developed a new type of reactor system capable of operating in the absence of heat and mass transfer limitations. He also studied catalyst design and the influence of operating parameters on a new reaction method to produce acrylic acid sustainably from renewably-sourced lactic acid. Dr. Mastalski earned a B.S. degree in Chemical Engineering from the University of Pittsburgh and completed research projects there on a variety of other topics, including natural gas-enabled large scale solar deployment, electrochemical processes to deposit defect-free thin films, and chemical looping procedures to produce carbon-negative syngas.

Dr. Mastalski is active in several professional societies, including ACS, AIChE, AAAS, and Tau Beta Pi Engineering Honor Society. He has also completed a number of additional projects related to sustainability, renewable energy implementation, science outreach, and community engagement and resiliency with a particular focus on climate change.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, University of Minnesota, Twin Cities, 2023

B.S., Chemical Engineering, University of Pittsburgh, 2018

UMN Institute on the Environment Boreas Leader

UMN Center for Urban and Regional Affairs Resilient Communities Project Fellow

Raul A. Caretta Outstanding Unit Operations Teaching Assistant Award

Peter and Gene Pierce Family Fellowship

Lanny & Charlotte Schmidt and Duane Goetsch & Nancy M. Dickerson Fellowship

H. Ted Davis Fellowship

Wanat Family Fellowship in Chemical Engineering

Tau Beta Pi Fellowship

Licenses and Certifications

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER)

Professional Affiliations

American Institute of Chemical Engineers

American Society of Mechanical Engineers

University of Minnesota Institute on the Environment

American Academy for the Advancement of Science

Catalysis Club of Chicago

American Chemical Society

Order of the Engineer

Tau Beta Pi Engineering Honors Society

Publications

Mastalski I. On the Intrinsic Kinetics of Polyethylene Pyrolysis. PhD Thesis 2023.

Mastalski I, Sidhu N, Zolghadr A, Maduskar S, Patel B, Uppili S, Go T, Wang Z, Neurock M, Dauenhauer PJ. Intrinsic Millisecond Kinetics of Polyethylene Pyrolysis via Pulse-Heated Analysis of Solid Reactions. Chemistry of Materials 2023; 35(9):3628–3639.

Mastalski I, Sidhu N, Dauenhauer P. Data for ‘On the Intrinsic Reaction Kinetics of Polypropylene Pyrolysis. Data Repository for the University of Minnesota 2023.

Mastalski I, Zolghadr A, Sidhu N, Facas G, Maduskar S, Uppili S, Go T, Neurock M, Dauenhauer PJ. On the Method of Pulse-Heated Analysis of Solid Reactions (PHASR) for Polyolefin Pyrolysis. ChemSusChem 2020; 14(19):4214-4227.

Mastalski I, Sidhu N, Zolghadr A, Dauenhauer P. High Speed Photography for Manuscript ‘On the Method of Pulse-Heated Analysis of Solid Reactions (PHASR) for Polyolefin Pyrolysis. Data Repository for the University of Minnesota 202

Mastalski I, More A, Veser G. Chemical Looping for Syngas Production. Ingenium: Undergraduate Research at the Swanson School of Engineering 2017; 3:56-60.

Presentations

Mastalski I. Pyrolysis to Promote Plastic Circularity. Oral presentation, UMN 2023 Sustainability Symposium, Minneapolis, MN, 2023.

Mastalski I. Intrinsic kinetics of polyethylene pyrolysis via pulse-heated analysis of solid reactions (PHASR): Enabling a plastic circular economy. Oral presentation, ACS Spring 2023, Indianapolis, IN,

2023.

Mastalski I. Pathway to a Plastic Circular Economy: Intrinsic Kinetic Insights of Polyethylene Pyrolysis via Pulse-Heated Analysis of Solid Reactions (PHASR). Oral presentation, AIChE Fall 2022, Phoenix, AZ, 2022.

Mastalski I, Sidhu N, Dauenhauer P. Pulse-Heated Analysis of Solid Reactions (PHASR) to Promote a Plastic Circular Economy: Intrinsic Kinetics of Polyethylene Pyrolysis. Poster presentation, AIChE Fall 2022, Phoenix, AZ, 2022.

Mastalski I. Promoting a plastic circular economy via pulse-heated analysis of solid reactions (PHASR): Intrinsic kinetic insights from polyethylene pyrolysis. Oral presentation, ACS Fall 2022, Chicago, IL, 2022.

Mastalski I, Sidhu N, Dauenhauer P. Promoting a plastic circular economy via polyethylene pyrolysis and catalysts: Intrinsic kinetic insights from pulse heated analysis of solid reactions (PHASR). Poster presentation, ACS Summer School on Green Chemistry and Sustainable Energy Poster Session, Golden, CO, 2022

Mastalski I. Pulse-Heated Analysis of Solid Reactions (PHASR) to study intrinsic kinetics of polyethylene pyrolysis. Oral presentation, PYRO 2022 – International Conference on Applied and Analytical Pyrolysis, Ghent, Belgium, 2022.

Mastalski I. Promoting a plastic circular economy through pyrolysis. Oral presentation, UMN Sustainability and Energy Expo 2022, Online, 2022.

Mastalski I, Sidhu N, Dauenhauer P. Promoting a plastic circular economy via polyethylene pyrolysis and catalysts: Intrinsic kinetic insights from pulse heated analysis of solid reactions (PHASR). Oral presentation, ACS Spring 2022, San Diego, CA, 2022.

Mastalski I, Sidhu N, Dauenhauer P. Promoting a plastic circular economy via polyethylene pyrolysis and catalysts: Intrinsic kinetic insights from pulse heated analysis of solid reactions (PHASR). Poster presentation, ACS Spring 2022, San Diego, CA, 2022.

Mastalski I, Zolghadr A, Sidhu N, Neurock M, Dauenhauer PJ. Polyethylene pyrolysis by pulse-heated analysis of solid reactions (PHASR): Pathway to a circular plastic economy. Oral presentation, ACS Spring 2021, Online, 2021.

Mastalski I, Zolghadr A, Sidhu N, Dauenhauer P. Pulse-Heated Analysis of Solid Reactions (PHASR) for Polyethylene Pyrolysis: Intrinsic Kinetics and Reaction Visualization. Poster presentation, 2021 RSC Poster Twitter Conference, Online, 2021.

Mastalski I, Dastalfo T, Ferreira C, Kelly K, Veser G. Natural Gas Enabled Solar Electricity Production. Poster presentation, Pitt Omega Chi Epsilon Chemical Engineering Research Day Poster Session, Pittsburgh, PA, 2018.

Mastalski I. Developing X-Ray Detectors For ATHENA X-IFU Through Morphologically-Controlled Electroplating. Poster presentation, NASA GSFC Intern Poster Session, Greenbelt, MD, 2017.

Mastalski I. Chemical Looping for Syngas Production. Poster presentation, Pitt Omega Chi Epsilon Chemical Engineering Research Day Poster Session, Pittsburgh, PA, 2017.

Mastalski I. Chemical Looping for Syngas Production. Oral presentation, Pitt Mascaro Center for Sustainable Innovation Summer Research Conference, Pittsburgh, PA, 2016.