# Hilal Ezgi Toraman

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**Dr. Hilal Ezgi Toraman** leads an interdisciplinary research program at Penn State focused on sustainable reaction engineering and catalysis for the valorization of non-traditional carbon feedstocks, particularly plastic waste. Her group integrates advanced pyrolysis experimentation, GC×GC-based analytics, and kinetic modeling to develop and optimize scalable chemical recycling technologies. She leads multi-institutional projects on mixed plastic pyrolysis and catalytic upgrading, where her group contributes intrinsic kinetic studies, GC×GC method development, and data management and analysis infrastructure to support process design and evaluation. Dr. Toraman has secured over \$5 million in research funding as a PI, published widely in high-impact journals, and received both national and international recognition including the *C&EN Talented 12, AIChE CRE Pioneers in Catalysis and Reaction Engineering*, and *ACS Energy & Fuels Rising Star* awards.

# **Professional Experience**

Assistant professor	August 2019-
Wilson Faculty Fellow	present
John and Willie Leone Family Department of Energy and Mineral Engineering	
(tenure home), Department of Chemical Engineering, Institute of Energy and the	
Environment, Penn State University, USA	
Post-doctoral researcher	April 2017-
Prof. Dr. Dion Vlachos' Group	August 2019
Delaware Energy Institute, Department of Chemical and Biomolecular Engineering	
University of Delaware, USA	
PhD researcher	September 2012-
Laboratory for Chemical Technology, Department of Chemical Engineering, Ghent	October 2016
University, Belgium	
Education	
Ph.D. in Chemical Engineering	
Ghent University, Belgium	2012-2016
Advisors: Prof. Dr. Kevin M. Van Geem and Prof. Dr. Guy B. Marin	
Thesis title: Fast pyrolysis for the circular economy: from plastic waste to genetically e	engineered
poplar	
M.Sc. in Chemical Engineering	2010-2012
Middle East Technical University, Turkey	
<u>Advisors</u> : Prof. Dr. Ufuk Bölükbaşı and Prof. Dr. Necati Özkan	
Thesis title: Investigation of alkaline pretreatment parameters on a multi-product bas	sis for the co-
production of glucose and hemicellulose based films from corn cobs	
B.Sc. in Chemical Engineering	2005-2010
Middle East Technical University, Turkey	

#### **Grants Awarded**

 Toraman, H.E. (PI, 65%), Linda Broadbelt (Co-PI), Konstantinos Alexopoulos (Co-PI), Rob Rioux (Co-PI), Mike Janik (Co-PI), Rui Shi (Co-PI), Prasenjit Mitra (Co-PI) "Chemical Recycling of Mixed PET/Polyolefin Streams Through Sequential Pyrolysis and Catalytic Upgrading" for \$3,440,894., Sponsored by REMADE Institute, DOE, (January 1, 2022-December 31, 2025)

- Toraman, H.E. (PI, 100%), Linda Broadbelt (Co-PI) "Design for Recyclability Assessing the Impact of Heteroatoms in Mixed Plastic Waste Streams on Pyrolysis Processes" for \$1,814,097. Sponsored by DOW, (January 15, 2022-January 14, 2026)
- Toraman, H. E. (Co-PI, 5%)"Consortium for Cultivating Human And Naturally reGenerative Enterprises (C-CHANGE)," for \$4,087,062.00. Sponsored by USDA-NIFA, (October 1, 2020 - September 30, 2025)
- Toraman, H.E. (PI, 100%), and Juliana Vasco-Correa (Co-PI) "Development of Data Mining Tools and an Open Source Web-Based Data Platform to Support the Sustainable Development of Plastic Recycling", ICDS Seed Grant, (May 1, 2021- April 30, 2022)

# **Student mentorship**

## Ph.D. Dissertation Advisor

Perez, B. A., Mechanistic understanding of the pyrolysis of polymers via kinetic analysis, design of experiments, and multivariate chromatographic analysis. (January 2021 - May 2025)

Okonsky, S., Investigation of the catalytic co-pyrolysis of polyethylene terephthalate and polyolefins with zeolite catalysts. (January 2020 - May 2024)

Lee, D. H., In Process. (August 2023 - Present)

Buddha, P., In Process. (August 2022 - Present)

Salmanzadeh, E., In Process. (January 2024 - Present)

## Postdoc Advisor

Krishna, J., Assessing the impact of heteroatoms in mixed plastic waste streams on pyrolysis processes. (November 2021 - May 2025)

Bozkurt, O., Conversion of polypropylene into light hydrocarbons and aromatics by metal exchanged zeolite catalysts. (February 2022 - January 2023)

#### M.Sc. Dissertation Advisor

Khan, R., Experimental study on the decomposition of antioxidants and interactions with polypropylene waste during their deconstruction. (August 2022 - May 2024)

#### Undergraduate Honor Dissertation Advisor

Caputo, G., Kinetic analysis of flame retardant additive effects during polypropylene pyrolysis.

(September 2021 - May 2024)

Tickerhoof, C., Method development for polyethylene terephthalate pyrolysis with two-dimensional gas chromatography. (February 2021 - May 2022)

# **Publications**

<u>Summary</u>: 24 A1 publications and more than 50 oral/poster presentations and invited talks at national/international conferences/universities. Underlined authors were supervised by me (undergraduate, graduate, or postdoctoral researchers); asterisk (\*) indicates corresponding author

#### **Peer Reviewed Publications**

- 1. <u>Perez, B. A., Krishna, J. J.,</u> & Toraman\*, H. E. (2025). Characterization of polyolefins-based pyrolysis oils: A comparison between one-dimensional gas chromatography and two-dimensional gas chromatography. *Journal of Chromatography A*, *1739*, 465510.
- 2. <u>Okonsky, S. T., Hogan, N. R.,</u> & Toraman\*, H. E. (2024). Effect of pyrolysis operating conditions on the catalytic co-pyrolysis of low-density polyethylene and polyethylene terephthalate with zeolite catalysts. *AIChE Journal*, *70*(12), e18548. (Nominated and invited for 2024 Futures Issue)

- 3. <u>Khan, R., Perez, B. A.</u>, & Toraman\*, H. E. (2024). Comparative analysis of additive decomposition using one-dimensional and two–dimensional gas chromatography: Part II-Irgafos 168 and zinc stearate. *Journal of Chromatography A*, *1732*, 465244.
- 4. <u>Khan, R., Perez, B. A.</u>, & Toraman\*, H. E. (2024). Comparative analysis of additive decomposition using one-dimensional and two-dimensional gas chromatography: Part I-Irganox 1010, Irganox 1076, and BHT. *Journal of Chromatography A*, *1732*, 465243.
- 5. <u>Jayarama Krishna, J. V., Perez, B. A.,</u> & Toraman\*, H. E. (2024). Parametric Study of Polyethylene Primary Decomposition Using a Micropyrolyzer Coupled with Two-Dimensional Gas Chromatography. *ACS Sustainable Chemistry & Engineering*, *12*(19), 7508-7518.
- 6. <u>Bozkurt, O. D.,</u> & Toraman\*, H. E. (2024). Conversion of Polypropylene into Light Hydrocarbons and Aromatics by Metal Exchanged Zeolite Catalysts. *Langmuir*, *40*(18), 9636-9650.
- 7. <u>Perez, B. A.</u>, & Toraman\*, H. E. (2024). Investigating primary decomposition of polypropylene through detailed compositional analysis using two-dimensional gas chromatography and principal component analysis. *Journal of Analytical and Applied Pyrolysis*, *177*, 106376.
- 8. <u>Perez, B. A., Krishna, J. J.,</u> & Toraman\*, H. E. (2023). Insights into co-pyrolysis of polyethylene terephthalate and polyamide 6 mixture through experiments, kinetic modeling and machine learning. *Chemical Engineering Journal*, *468*, 143637.
- 9. Dong, Q., Yao, Y., Cheng, S., Alexopoulos, K., Gao, J., Srinivas, S., Toraman, H.E.... & Hu, L\*. (2022). Programmable heating and quenching for efficient thermochemical synthesis. *Nature*, *605*(7910), 470-476.
- 10. <u>Bozkurt, O. D., Okonsky, S. T.</u>, Alexopoulos, K., & Toraman\*, H. E. (2022). Catalytic conversion of SPW and products upgrading. *Advances in Chemical Engineering*, *60*(1), 117-168.
- 11. <u>Perez, B. A., Jonnalagedda, V. J. K.,</u> & Toraman\*, H. E. (2022). Characterization of SPW pyrolysis oils: Products spectra and opportunities. *Advances in Chemical Engineering* (Vol. 60, No. 1, pp. 169-214). Academic Press.
- 12. <u>Okonsky, S. T., Krishna, J. J.</u>, & Toraman\*, H. E. (2022). Catalytic co-pyrolysis of LDPE and PET with HZSM-5, H-beta, and HY: experiments and kinetic modelling. *Reaction Chemistry & Engineering*, *7*(10), 2175-2191. (Nominated and invited for Emerging Investigator Series)
- 13. Toraman, H. E., Alexopoulos, K., Oh, S. C., Cheng, S., Liu, D., & Vlachos\*, D. G. (2021). Ethylene production by direct conversion of methane over isolated single active centers. *Chemical Engineering Journal*, *420*, 130493.
- SriBala, G., Toraman, H. E., Symoens, S., Déjardin, A., Pilate, G., Boerjan, W., ... & Marin\*, G. B. (2019). Analytical Py-GC/MS of genetically modified poplar for the increased production of bioaromatics. *Computational and Structural Biotechnology Journal*, 17, 599-610.
- Toraman, H. E., Abrahamsson, V., Vanholme, R., Van Acker, R., Ronsse, F., Pilate, G., ... & Marin\*, G. B. (2018). Application of Py-GC/MS coupled with PARAFAC2 and PLS-DA to study fast pyrolysis of genetically engineered poplars. *Journal of Analytical and Applied Pyrolysis*, *129*, 101-111.
- 16. Toraman, H. E., Franz, K., Ronsse, F., Van Geem, K. M., & Marin\*, G. B. (2016). Quantitative analysis of nitrogen containing compounds in microalgae based bio-oils using comprehensive twodimensional gas-chromatography coupled to nitrogen chemiluminescence detector and time of flight mass spectrometer. *Journal of Chromatography A*, *1460*, 135-146.
- Negahdar, L., Gonzalez-Quiroga, A., Otyuskaya, D., Toraman, H. E., Liu, L., Jastrzebski, J. T., ... & Weckhuysen\*, B. M. (2016). Characterization and comparison of fast pyrolysis bio-oils from pinewood, rapeseed cake, and wheat straw using 13C NMR and comprehensive GC× GC. ACS Sustainable Chemistry & Engineering, 4(9), 4974-4985.
- Toraman, H. E., Vanholme, R., Borén, E., Vanwonterghem, Y., Djokic, M. R., Yildiz, G., ... & Marin\*, G. B. (2016). Potential of genetically engineered hybrid poplar for pyrolytic production of bio-based phenolic compounds. *Bioresource Technology*, 207, 229-236.

- 19. Yildiz, G., Ronsse, F., Vercruysse, J., Daels, J., Toraman, H. E., Van Geem, K. M., ... & Prins\*, W. (2016). In situ performance of various metal doped catalysts in micro-pyrolysis and continuous fast pyrolysis. *Fuel processing technology*, *144*, 312-322.
- 20. Toraman, H. E., Dijkmans, T., Djokic, M. R., Van Geem, K. M., & Marin\*, G. B. (2014). Detailed compositional characterization of plastic waste pyrolysis oil by comprehensive two-dimensional gaschromatography coupled to multiple detectors. Journal of Chromatography A, 1359, 237-246.
- 21. Yildiz, G., Lathouwers, T., Toraman, H. E., Van Geem, K. M., Marin\*, G. B., Ronsse, F., ... & Prins, W. (2014). Catalytic fast pyrolysis of pine wood: effect of successive catalyst regeneration. *Energy & fuels*, *28*(7), 4560-4572.
- 22. Bahcegul, E., Toraman, H. E., Erdemir, D., Akinalan, B., Ozkan, N., & Bakir\*, U. (2014). An unconventional approach for improving the integrity and mechanical properties of xylan type hemicellulose based films. *RSC advances*, *4*(64), 34117-3412.
- 23. Bahcegul, E., Akinalan, B., Toraman, H. E., Erdemir, D., Ozkan, N., & Bakir<sup>\*</sup>, U. (2013). Extrusion of xylans extracted from corn cobs into biodegradable polymeric materials. *Bioresource technology*, *149*, 582-585.
- 24. Bahcegul, E., Toraman, H. E., Ozkan, N., & Bakir\*, U. (2012). Evaluation of alkaline pretreatment temperature on a multi-product basis for the co-production of glucose and hemicellulose based films from lignocellulosic biomass. *Bioresource technology*, *103*(1), 440-445.

# **Publications in Progress**

- 1. <u>Lee, D. H., Krishna, J.J.,</u> Toraman\*, H. E. Oil refining and recycling research. *Gas Chromatography-Mass Spectrometry for Omics Applications and Non-targeted Analysis*. (In Progress - under revision).
- Okonsky. S., Krishna, J. J., Lee, D.H. & Toraman\*, H. E. Kinetic Modelling and Measurement of Catalyst Deactivation for the Catalytic Co-Pyrolysis of PP and PET with HZSM-5. (In Progress expected submission date June 2025).
- 3. <u>Perez, B. A.</u>, & Toraman\* Experimental insights into the primary decomposition of polyethylene terephthalate through design of experiments and two-dimensional gas chromatography. (In Progress expected submission date June 2025).
- 4. <u>Okonsky. S., Lee, D.H., Krishna, J. J.,</u> & Toraman\*, H. E. Effect of Zeolite Desilication on the Catalytic Co-Pyrolysis of PP and PET with HZSM-5. (In Progress expected submission date 2025).
- 5. <u>Budha, P.,</u> & Toraman\*, H. E. Pyrolysis of Ethylene Vinyl Alcohol: Experimental Study Towards Intrinsic Kinetics. (In Progress - expected submission date 2025).
- 6. <u>Perez, B. A., Krishna, J.J.</u>& Toraman, H.E.\* Unraveling the Complexity of Mixed Plastic Pyrolysis Vapors: A Comparative Study Using GC and GC×GC for Feedstock and Catalyst Optimization. (In Progress expected submission date 2025).
- <u>Zhang, N., Heaton, C., Okonsky, S. T.,</u> Mitra\*, P., & Toraman\*, H. E. PEaCE: A Chemistry-Oriented Dataset for Optical Character Recognition on Scientific Documents. *arXiv preprint arXiv:2403.15724*. (In Progress - expected submission date 2025).
- 8. Raghu, A., <u>Krishna, J. J.</u>, Toraman<sup>\*</sup>, H. E., Broadbelt<sup>\*</sup>, L. Mechanistic modeling of pyrolysis of LLDPE (In Progress expected submission date 2025).
- 9. Raghu, A., <u>Krishna, J. J.</u>, Toraman<sup>\*</sup>, H. E., Broadbelt<sup>\*</sup>, L. Mechanistic modeling of the pyrolysis of binary mixtures of polyolefins (In Progress expected submission date 2025).
- 10. Shaw, A., <u>Perez, B. A.</u>, Toraman\*, H. E., Broadbelt\*, L. Mechanistic modeling of the temporal evolution of products from polypropylene pyrolysis (In Progress expected submission date 2025).
- 11. Best, A., <u>Budha, P</u>, Toraman\*, H. E., Broadbelt\*, L. Capturing the depolymerization of poly(vinyl alcohol) using kinetic modeling at the mechanistic level (In Progress expected submission date 2025).

- 12. Best, A., <u>Budha, P</u>, Toraman\*, H. E., Broadbelt\*, L. Mechanistic modeling of EvOH depolymerization (In Progress expected submission date 2026).
- 13. Lin, D., <u>Perez, B. A.</u>, Toraman\*, H. E., Broadbelt\*, L. Mechanistic modeling of PET pyrolysis (In Progress expected submission date 2026).

# **Equipment and Facilities**

The Toraman Research Group operates three laboratories across Penn State's Research West and East Buildings, including shared spaces with affiliated researchers. Core capabilities include four fume hoods for chemical synthesis, high-precision balances (including a Mettler Toledo XPR26DR microbalance), cryogenic grinder, centrifuge, furnaces, drying ovens, glovebox, gas cabinets (hydrogen and methane), and other essential bench-scale tools. The group houses the following reactor and analytical equipment:

- A tandem microreactor system (Frontier Laboratories) coupled with comprehensive twodimensional gas chromatography (GC×GC) (Agilent 7890A) with an Insight flow modulator (Sepsolve) connected to a time-of-flight mass spectrometry (TOF-MS) (Markes) and flame ionization detector (FID) (Agilent) system along with an autosampler (Frontier Laboratories).
- 2. A second tandem microreactor (Frontier Laboratories) coupled to a GC×GC-FID/TOF-MS (LECO) to be installed in June 2025.
- 3. A double shot pyrolyzer (Frontier Laboratories) connected to a GC with quadruple mass spectrometry (Shimadzu).
- 4. A bench scale fixed bed reactor system (under installation) for solid-to-gas reactions
- 5. A Multiwave 5000 microwave reactor (Anton Paar)
- 6. A Custom GC (Shimadzu) for permanent gas analysis and light hydrocarbons up to C10.

The group has several licenses for ChromSpace software (Sepsolve) for processing GC×GC data. The group employs CDS Pyroprobe 6200 connected to ISQ Single Quad GC-MS at the Environmental Contaminants Analytical Laboratory of Penn State's Institute of Energy and the Environment. The Toraman group has access to a range of advanced facilities for catalyst characterization, including Malvern Panalytical Empyrean X-ray diffraction (XRD), Thermo Scientific Apreo 2S Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectroscopy (EDS). Additionally, they utilize the Micromeritics ASAP 2420 system for surface area and porosimetry measurements, as well as Fourier transform infrared spectroscopy (FTIR), which is available at the Materials Characterization Lab (MCL). For their analytical needs, the group employs Thermo iCAP 7400 Inductively Coupled Plasma Emission Spectrometry (ICP-AES) at the Laboratory for Isotopes and Metals in the Environment (LIME), which is part of the Earth and Environmental Systems Institute. Moreover, NMR spectrometers are accessible through the Department of Chemistry for their spectroscopic analyses.

# **Teaching Experience**

- 1. Instructor for three courses annually at Penn State:
  - EGEE 464: Energy Design Project (Spring 2020-2025)
  - o EGEE 439: Alternative Fuels from Biomass Sources (Spring 2020, Fall 2020-2024)
  - EME 597/CHE 597: Sustainable chemical conversion for non-traditional feedstocks (Spring 2022-2025)
- 2. Penn State University: Currently advisor for 1 postdoc, 4 graduate and 2 undergraduate students.
- 3. Guest instructor for Applied Chemical Kinetics (2018) and Special Topics in Energy (2019) at University of Delaware

- 4. Mentoring and coaching 5 Master thesis students and 3 Undergraduate students at Ghent University (2012-2016)
- 5. Teaching assistant for Chemistry Laboratory (2012) and Introduction to Computers and Fortran Programming (2012) at Middle East Technical University

## **Honors and Awards**

- 1. Chemical & Engineering News' (C&EN) esteemed list of Talented 12 (2023)
- 2. Pioneers of Catalysis and Reaction Engineering (CRE) honorary session by the CRE division of the American Institute of Chemical Engineers (AIChE) (2023)
- 3. Rising Star by the American Chemical Society's Division of Energy & Fuels (2023)
- 4. International Symposium for Chemical Reaction Engineering (ISCRE) 27 Conference Travel Award (2023)
- 5. Wilson Faculty Fellowship (2023-2026)
- 6. Virginia S. and Philip L. Walker, Jr. Faculty Fellowship (2019-2022)
- 7. North American Symposium for Chemical Reaction Engineering (NASCRE) 4 Travel Award (2019)
- 8. Ghent University Graduate Research Fellow, Belgium (2012-2016)
- 9. Scientific and Technological Research Council of Turkey (TUBITAK) personal scholarship for M.Sc. study

# **Major Professional Activities, Memberships and Services**

- 1. Elected president of Pittsburgh-Cleveland Catalysis Society (PCCS)
- 2. Elected director for Catalysis and Reaction Engineering (CRE) Division of American Institutes of Chemical Engineers (AIChE)
- 3. DEI Social Media Co-Chair of Catalysis and Reaction Engineering (CRE) Division of American Institutes of Chemical Engineers (AIChE)
- 4. Symposium organizer and session chair for ACS, AIChE and PCCS Meetings.
- 5. International Technical Committee Member for 2020 International Conference on Oil, Gas and Coal Technology (ICOGCT 2020)
- 6. Member of the Editorial Board for ACS Engineering Au
- 7. Member of the International Editorial Board for Fuel Communications
- 8. Invited guest editor for Fuel Communications for the special issue on Chemical Recycling of Plastics: No More Waste
- 9. Member of the Sustainability Committee at the College of Earth and Mineral Sciences related to research activities
- 10. Member of the Graduate Student Recruiting Subcommittee at the Department of Energy and Mineral Engineering
- 11. Reviewing manuscripts for journals such as Nature Communications, Bioresource Technology, Biomass and Bioenergy, Chemical Engineering Journal, Fuel, One Earth, Energy and Fuels, Journal of Analytical and Applied Pyrolysis, Combustion and Flame, Catalysis Science & Technology, Journal of Environmental Chemical Engineering, Energy Conversion and Management, Industrial & Engineering Chemistry Research, Nature Communications Engineering
- 12. Grant proposal reviewing for American Chemical Society, National Science Foundation, REMADE Institute and Western Sun Grant Center

# Presentations

## **Oral presentations**

- 1. Toraman, H. E. (Presenter). "Intrinsic kinetics for polyethylene pyrolysis," American Chemical Society Spring 2025 Meeting, American Chemical Society, San Diego, CA, USA, (March 24, 2025), **Invited**. International.
- 2. Toraman, H. E. (Presenter). "Enhancing Product Characterization and Catalysis Insights through Two-Dimensional Gas Chromatography (GC×GC) ", Southeastern Catalysis Society (SECS) Annual Symposium, Clemson University, Clemson, SC, USA, (February 10, 2025), **Invited**. Regional.
- Toraman, H. E. (Presenter). "Advancing Product Analysis and Polymer Recycling Strategies with Two-Dimensional Gas Chromatography (GC×GC) " in the "In Honor of the Amundson Awardee session: Prof. Dion Vlachos" 2025 North American Symposium for Chemical Reaction Engineering, Houston, Texas, USA, (February 18, 2025), Invited. International.
- 4. Krishna, J., Perez, B., Toraman, H. E. (Presenter), 2024 American Institute of Chemical Engineers Annual Meeting-- AIChE Journal Futures: New Directions in Chemical Engineering Research, "Insights into Intrinsic Kinetics for HDPE Pyrolysis through Experiments and Data Science," San Diego, CA, USA. (October 27, 2024 - October 31, 2024), **Invited**. International.
- Krishna, J. (Presenter), Okonsky, S., Hogan, N., Toraman, H. E., 2024 American Institute of Chemical Engineers Annual Meeting, "Catalytic Co-Pyrolysis of Low Density Polyethylene (LDPE) and Polyethylene Terephthalate (PET) with HZSM-5 and HY Zeolite Catalysts," San Diego, CA, USA. (October 27, 2024 - October 31, 2024), Accepted. International.
- Krishna, J. (Presenter), Okonsky, S., Hogan, N., Toraman, H. E., 2024 American Institute of Chemical Engineers Annual Meeting, "Characterization of Plastic-Based Pyrolysis Oils: A Comparison between One-Dimensional Gas Chromatography and Two-Dimensional Gas Chromatography," San Diego, CA, USA. (October 27, 2024 - October 31, 2024), Accepted. International.
- Krishna, J. (Presenter), Perez, B., Toraman, H. E., 2024 American Institute of Chemical Engineers Annual Meeting, "Experimental Study of Intrinsic Kinetics for the Pyrolysis of Polypropylene in a Microreactor Using Detailed Compositional and Principal Component Analysis," San Diego, CA, USA. (October 27, 2024 - October 31, 2024), Accepted. International.
- Toraman, H. E. (Presenter). "Addressing the Plastic Waste Challenge: The Vital Role of Analytical Chemistry and Spectroscopy – A Chemical Engineer's Perspective" Society for Analytical Chemists of Pittsburgh and the Spectroscopy Society of Pittsburgh Monthly Meeting, Pittsburgh, PA, USA, (October 10, 2023), Invited. Regional.
- 9. Toraman, H. E. (Presenter). "Sustainable Chemical Conversion of Non-Traditional Feedstocks to Fuels, Chemicals and Materials" Braskem, Pittsburgh, PA, USA, (October 10, 2023), **Invited**. Local.
- 10. Toraman, H. E. (Presenter). " Comprehensive two-dimensional gas chromatography (GC×GC) method development for detailed characterization of pyrolysis" A Celebration of Women In Science 2023, (February 10, 2023), **Invited**.
- 11. Toraman, H. E. (Presenter). "Sustainable Chemical Conversion of Non-Traditional Feedstocks to Fuels, Chemicals and Materials", Shell, USA, (June 20, 2023), **Invited**.
- 12. Toraman, H. E. (Presenter). "Open source web-based data platform to support the sustainable development of plastic recycling," American Chemical Society Fall 2023 Meeting, American Chemical Society, San Francisco, CA, USA, (August 15, 2023), **Invited**. International.
- 13. Toraman, H. E. (Presenter). "C&EN's Talented 12: Sustainable Chemical Conversion of Non-Traditional Feedstocks," American Chemical Society Fall 2023 Meeting, American Chemical Society, San Francisco, CA, USA, (August 14, 2023), **Invited**. International.
- 14. Toraman, H. E. (Presenter). "Systematic approach to develop mechanistic insights into primary decomposition of polymers," American Chemical Society Fall 2023 Meeting, American Chemical Society, San Francisco, CA, USA, (August 13, 2023), **Invited**. International.

- Perez, B. (Presenter), & Toraman, H. E. "Characterization of polypropylene based pyrolysis oils: A comparison between one dimensional gas chromatography and two-dimensional gas chromatography," 20th International GC×GC Symposium, Canmore, Alberta, Canada, (May 31, 2023). Accepted. International.
- 16. Okonsky, S. (Presenter), & Toraman, H. E. "Utilization of a micro-pyrolysis flow-modulated GC×GC/TOFMS-FID system for studying the catalytic pyrolysis of mixed plastic waste," 20th International GC×GC Symposium, Canmore, Alberta, Canada, (May 31, 2023), Accepted. International.
- 17. Toraman, H. E. (Presenter). "GC×GC method development for detailed characterization of pyrolysis oils from plastics," 20th International GC×GC Symposium, Canmore, Alberta, Canada, (May 28, 2023), Accepted. International.
- Okonsky, S. (Presenter), Krishna, J., & Toraman, H. E. "Characterization of Zeolite Catalysts Used for the Catalytic Pyrolysis of Plastic Waste," 2023 Pittsburgh – Cleveland Catalysis Society Annual Meeting, Pittsburgh – Cleveland Catalysis Society, State College, PA, USA, (May 22, 2023), Invited. Local.
- Perez, B. (Presenter), & Toraman, H. E. "Experimental approach in the investigation of primary decomposition of polypropylene using a Py-GCxGC-FID/TOF-MS system and data science," 2023 Pittsburgh – Cleveland Catalysis Society Annual Meeting, Pittsburgh – Cleveland Catalysis Society, State College, PA, USA, (May 22, 2023), Invited. Local. PCCS – Lubrizol Honorary Lecture Award Presentation
- Okonsky, S. (Presenter), Krishna, J., & Toraman, H. E. "Catalytic co-pyrolysis of LDPE and PET with HZSM-5, H-Beta, and HY: experiments and kinetic modelling," Penn State College of Engineering Research Symposium (CERS), The Pennsylvania State University, State College, PA, USA, (April 12, 2023, 2<sup>nd</sup> place in Materials and Characterization category.
- 21. Perez, B. (Presenter), & Toraman, H. E. "Investigation of primary decomposition of polypropylene using a Py-GCxGC-FID/TOF-MS system," Remade Circular Economy Tech Summit and Conference, The Remade Institute, Washington D.C., USA, (March 21, 2023), Accepted. International.
- 22. Okonsky, S., Krishna, J., & Toraman, H. E. (Presenter). "Catalytic Co-Pyrolysis of LDPE and PET with HZSM-5, H-Beta, and HY: Experiments and Kinetic Modeling," 2022 American Institute of Chemical Engineers Annual Meeting, Phoenix, AZ, USA, (November 13, 2022 November 18, 2022). **Invited**. International.
- Okonsky, S. (Presenter), Krishna, J., & Toraman, H. E. "Catalytic Pyrolysis of Polyolefins and Polyethylene Terephthalate (PET) with Zeolite Catalysts," Penn State Chemical Engineering Graduate Symposium, The Pennsylvania State University, State College, PA, USA. (September 16, 2022). Local. Best Presentation Award
- 24. Toraman, H. E. (Presenter). "Fundamental Understanding of Interaction Effects in Mixed Plastic Waste Pyrolysis," American Chemical Society Fall 2022 Meeting, American Chemical Society, Chicago, IL, USA, (August 21, 2022 August 25, 2022), **Invited**. International.
- 25. Toraman, H. E. (Presenter). "How to Transform Plastic Waste into a 21st Century Resource by Combining Experiments, Data Science and Theory," 2022 EME Research Showcase, The Pennsylvania State University, State College, PA, USA, (April 27, 2022), Invited. National.
- 26. Toraman, H. E. (Presenter). "Sustainable Chemical Conversion for Alternative Feedstocks," Penn State University Chemical Engineering Barrer Lecture Series Seminars, Chemical Engineering Department at The Pennsylvania State University, State College, PA, USA, (March 30, 2022), **Invited**.
- Toraman, H.E., (Presenter) "How to Transform Plastic Waste into a 21st Century Resource by Combining Experiments, Data Science and Theory ", Material Day 2021 of Penn State University, (October 13, 2021). Invited, Local.
- 28. Toraman, H.E., (Presenter) "How to Transform Waste into a 21st Century Resource by Combining

Experiments, Data Science and Theory", 2021 Annual Meeting of Pittsburgh-Cleveland Catalysis Society, Pittsburgh, PA, USA, (October 15, 2021), **Invited**. Local.

- Toraman, H.E., (Presenter) "Direct Conversion of Methane to Fuels and Chemicals", 2021 2nd International Conference on Oil, Gas and Coal Technology (ICOGCT 2021), (July 15 2021). Invited. International.
- Toraman, H. E., (Presenter), Alexopoulos, K., Vlachos, D. G., "Multiscale modeling for non-oxidative methane coupling over earth abundant catalysts", NASCRE-4, Houston Texas, USA, (March 10-13, 2019), Accepted. International.
- Toraman, H. E., (Presenter), Alexopoulos, K., Vlachos, D. G, "Multiscale modeling for non-oxidative methane coupling over an iron/silica catalyst", Catalysis Club of Philadelphia (CCP) Meeting, Wilmington, USA, (January 17, 2019), Invited, Regional.
- 32. Toraman, H. E., (Presenter), Alexopoulos, K., Oh, S. C., Liu, D., Vlachos, D. G, "Microkinetic modeling of direct, non-oxidative conversion of methane to value-added chemicals over iron/silica catalyst", Annual AIChE Meeting, Pittsburgh, USA, (October 28-November 2, 2018), Accepted. International.
- 33. Avanesian, T., Wittreich, G., Toraman, H.E., Vlachos, D. G, (Presenter) "Ethane dehdyrogenation on Pt-based catalysts", Annual AIChE Meeting, Pittsburgh, USA, (October 28-November 2, 2018), Accepted. International.
- Toraman, H. E., (Presenter) "Nothing goes to waste: sustainable utilization of complex feedstocks for the circular economy", Materials Science and Nanotechnology Engineering, TOBB ETU, Ankara, Turkey, (January 11, 2017), Invited.
- 35. Toraman, H. E., (Presenter) "Nothing goes to waste: fast pyrolysis of complex feedstocks for the circular economy", Department of Chemical Engineering, Izmir Institute of Technology, Izmir, Turkey, (August 29, 2016), **Invited**.
- 36. Toraman, H.E., (Presenter)Franz, K., Priharto, N., Yildiz, G., Ronsse, F., Prins, W., Van Geem, K.M., Marin, G.B., "Quantitative analysis of nitrogen containing compounds in micro-algae based bio-oil using GC × GC – NCD/TOF-MS", 14<sup>th</sup> International Symposium on Hyphenated Techniques in Chromatography and Separation Technology, Ghent, Belgium, (January 27-29, 2016), Accepted, International.
- Mihailof C., Iliopoulou E.F., (Presenter) Lappas A.A., Toraman H.E., Thybaut J.W., Van Geem K.M., Marin G., "Characterization studies of waste bio-derived feedstock, 3<sup>rd</sup> International Conference Catalysis for Renewable sources: fuel, energy, chemicals", Catania, Sicily, Italy, (September 6 - 11, 2015), Accepted, International.
- Yildiz, G., (Presenter)Lathouwers, T., Toraman, H.E., Van Geem, K.M., Ronsse, F., Van Duren, R., Kersten, S.R.A., Prins, W., "Effect of sequential catalyst regeneration in catalytic fast pyrolysis of biomass", 20<sup>th</sup> International symposium on Analytical and Applied Pyrolysis (PYRO 2014), Birmingham, UK, (June 2-6, 2014), Accepted, International.
- Toraman, H.E., (Presenter)Vanholme, R., Djokic, M.R., Yildiz, G., Ronsse, F., Prins, W., Boerjan, W., Van Geem, K.M., Marin, G.B., "Fast pyrolysis of genetically modified biomass", 10<sup>th</sup> International Conference on Renewable Resources and Biorefineries (RRB-10), Valladolid, Spain, (June 4-6, 2014), Accepted, International.
- 40. Toraman, H.E., (Presenter)Dijkmans, T., Djokic, M.R., Van Geem, K.M., Marin, G.B., "Trace Impurity Analysis in Complex Hydrocarbon Matrices with SIFT-MS and LowoxMS", European Symposium on Advances in SIFT-MS, Breda, The Netherlands, (February 3-4, 2014), **Invited,** International.
- 41. Toraman, H.E., (Presenter)Dijkmans, T., Djokic, M.R., Van Geem, K.M., Marin, G.B., "Assessing the clean character of plastic waste pyrolysis oils by comprehensive 2D GC", 13<sup>th</sup> International Symposium on Hyphenated Techniques in Chromatography and Separation Technology (HTC-13), Bruges, Belgium, (January 29-31, 2014), Accepted, International.

 Van Geem, K.M., (Presenter) Toraman, H.E., Schietse, M., Boren, E., Vanholme, R., Gerber, L., Djokic, M., Yildiz, G., Ronsse, F., Prins, W., Sundberg, B., Boerjan, W., Marin, G.B. "Biomass reaction engineering driving genetic modification", Annual AIChE Meeting, San Francisco, USA, (November 3-8, 2013), Accepted, International.

## Poster presentations

- 43. Okonsky, S., Lee, D. H. (Presenter), McAllister, M., Toraman, H. E., 2024 American Institute of Chemical Engineers Annual Meeting, "Effect of Zeolite Desilication on the Catalytic Co-Pyrolysis of PP and PET with HZSM-5," San Diego, CA, USA. (October 27, 2024 October 31, 2024).
- 44. Lee, D. H. (Presenter), Toraman, H. E., EME Research Showcase, "Incorporating Zeolite Desilication for the Catalytic Co-Pyrolysis of PP and PET Using HZSM-5," Department of Energy and Mineral Engineering, University Park, PA, USA. (October 2024).
- 45. Buddha, P. (Presenter), Toraman, H. E., EME Research Showcase, "Pyrolysis of Ethylene Vinyl Alcohol (EvOH)," Department of Energy and Mineral Engineering, University Park, PA, USA. (October 2024).
- 46. Lee, D. H. (Presenter), Toraman, H. E., 2024, "Implementation of zeolite desilication for the catalytic co-pyrolysis of PP and PET using HZSM-5," Pittsburgh Cleveland Catalysis Society, Pittsburgh, PA, USA. (September 30, 2024).
- 47. Okonsky, S. (Presenter), Toraman, H. E., 2024, "Kinetic Modelling and Measurement of Catalyst Deactivation for the Catalytic Co-Pyrolysis of PP and PET with HZSM-5," Pittsburgh Cleveland Catalysis Society, Pittsburgh, PA, USA. (September 30, 2024).
- 48. Budha, P. (Presenter), Toraman, H. E., 2024, "Pyrolysis of Ethylene Vinyl Alcohol (EvOH)," Pittsburgh Cleveland Catalysis Society, Pittsburgh, PA, USA. (September 30, 2024).
- 49. Toraman, H. E. (Presenter), Remade Circular Economy Tech Summit and Conference, "Chemical Recycling of Mixed PET/Polyolefin Streams Through Sequential Pyrolysis and Catalytic Upgrading," The Remade Institute, Washington D.C., USA. (April 2024).
- 50. Toraman, H.E., (Presenter) Franz, K., Priharto, N., Yildiz, G., Ronsse, F., Prins, W., Van Geem, K.M., Marin, G.B., Quantitative analysis of nitrogen containing compounds in micro-algae based bio-oil using GC × GC – NCD/TOF-MS, 14<sup>th</sup> International Symposium on Hyphenated Techniques in Chromatography and Separation Technology, Ghent, Belgium, (January 27-29, 2016).
- Vargas, D.C., Toraman, H.E., (Presenter) Carstensen, H.H., Streitwieser, D.A., Van Geem, K.M., Marin, G.B., Experimental study on the initial thermal decomposition of resorcinol, 21<sup>st</sup> International Symposium on Analytical and Applied Pyrolysis (PYRO 2016), Nancy, France, (May 9-12, 2016)
- Toraman, H.E., (Presenter)Carstensen, H.-H., Van Geem, K.M., Marin, G.B., Fast pyrolysis of lignocellulosic biomass: design and construction of a micro-pyrolysis setup for intrinsic kinetic measurements, 9<sup>th</sup> International Conference on Chemical Kinetics (ICCK), Ghent, Belgium, (June 28-July 2, 2015).
- 53. Toraman, H.E., (Presenter) Dijkmans, T., Djokic, M.R., Van Geem, K.M., Marin, G.B., Assessing the clean character of plastic waste pyrolysis oil by comprehensive 2D-GC, IAP P7/05 annual meeting, Louvain-La-Neuve, Belgium, (September 19, 2014).
- 54. Toraman, H.E., (Presenter)Van Geem, K.M., Marin, G.B., Fast pyrolysis of lignocellulosic biomass, IAP P7/05 annual meeting, Ghent, Belgium, (September 18, 2013).
- Toraman, H.E., (Presenter) Van Geem, K.M., Marin, G.B., Gasification and fast pyrolysis of lignocellulosic biomass, Ghent Biobased Economy Summer School, Ghent, Belgium, (August 19 – 22, 2013).
- Toraman, H.E., (Presenter)Van Geem, K.M., Marin, G.B., Gasification and Fast Pyrolysis of Lignocellulosic Biomass, Methusalem International Advisory Board Meeting (M2dcR2), Ghent, Belgium, (June 24, 2013).