E. Zeynep Ayla

Ph.D., CFEI

Senior Staff Consultant

Dr. Zeynep Ayla is a chemical engineer with expertise in the areas of fire and explosion investigation, fire dynamics, process safety and hazard analysis, combustible dusts, oxidation catalysis, and reaction engineering. Dr. Ayla has experience in catalytic synthesis and characterization, kinetic analysis, batch and flow reactor design, heat and mass transfer, gas chromatography, and UV-Vis, FTIR, and Raman spectroscopy.

At ESi, she specializes in fire, explosion, and chemical release investigations, origin and cause, failure analysis, dust hazard analyses, pressure relief systems, appliance failures, and hazardous chemical distribution systems. She is also experienced in the evaluation of catalyst performance in industrial systems, industrial chemical process arbitration and patent cases, and consumer product litigation including fuel dispensing systems.

Education

Ph.D., Chemical Engineering. University of Illinois at Urbana-Champaign, 2022

MS, Chemical Engineering. University of Illinois at Urbana-Champaign, 2019

BS, Chemical Engineering, minor in Sustainability, Arizona State University, 2017

Licenses & Certifications

- Certified Fire and Explosion Investigator (CFEI) License No. 27866-16694

Languages

- English
- Turkish

Contact Information

zayla@engsys.com

(206) 622-2007

ESi Seattle

700 S Industrial Way
Seattle, WA 98108

Areas of Specialization

- Analytical Chemistry
- Chemical and Manufacturing Processes
- Consumer Product Analysis
- Dust and Process Hazard Analysis
- Fire and Explosion
- Industrial and Process Safety

Positions Held

Engineering Systems Inc., Seattle, Washington

- Senior Staff Consultant, 2024 – Present

Exponent, Inc., Thermal Sciences, Natick, Massachusetts

- Associate, 2022 – 2024

Dow Chemical Company, Reaction Engineering R&D, Lake Jackson, Texas

- Graduate Student Intern, 2021

Continuing Education

- **American Institute of Chemical Engineers (AIChE) DIERS Basic Emergency Relief System Design** – 2025
- **SFPE Introduction to Fire Dynamics Simulator and Smokeview** – 2025
- **Hazardous Waste Operations and Emergency Response (OSHA HAZWOPER) 40-Hr Certification**

Professional Affiliations/Honors

- American Institute of Chemical Engineers (AIChE)
- American Society for Testing and Materials (ASTM) Committee E27 on Hazard Potential of Chemicals National Association of Fire Investigators (NAFI)
- Society of Women Engineers (SWE)

Publications

Kwon, O.; **Ayla, E.Z.**; Potts, D.S.; Flaherty, D.W.; “Influence of Ti-incorporated Zeolite Topology and Pore Condensation on Vapor Phase Propylene Epoxidation Kinetics with Gaseous H_2O_2” *Angewandte Chemie International Edition* ***2024***.

Kwon, O.; **Ayla, E.Z.**; Potts, D.S.; Flaherty, D.W.; “Effects of Solvent-Pore Interaction on Rates and Barriers for Vapor Phase Alkene Epoxidation with Gaseous H_2O_2 in Ti-BEA Catalysts” *ACS Catalysis* ***2023***, 13, 6430-6444.

Ayla, E.Z.; Patel, D.; Harris, A.; Flaherty, D.W.; “Identity of the Metal Oxide Support Controls Outer Sphere Interactions that Change Rates and Barriers for Alkene Epoxidations at Isolated Ti Atoms” *Journal of Catalysis* ***2022****,* 411, 167-176.

Bregante, D.T.; Chan, M.C.; Tan, J.Z.; **Ayla, E.Z.;** Nicholas, C.P.; Shukla, D.; Flaherty, D.W.; “The shape of water in zeolites and its impact on epoxidation catalysis” *Nature Catalysis, 2021, 4*, 9, 797-808.

Yun, D.; **Ayla, E.Z.;** Bregante, D.T.; Flaherty, D.W.; "Reactive Species and Reaction Pathways for the Oxidative Cleavage of 4-Octene and Oleic Acid with H_2O_2 over Tungsten Oxide Catalysts" *ACS Catalysis* ***2021*** 11, 3137-3152.

Ayla, E.Z.; Potts, D.S.; Bregante, D.T.; Flaherty, D.W.; "Alkene Epoxidations with H_2O_2 over Groups 4-6 Metal-Substituted BEA Zeolites: Reactive Intermediates, Reaction Pathways, and Linear Free-Energy Relationships" *ACS Catalysis* ***2020,*** 11, 139-154.

Bregante, D.T.; Potts, D.S.; Kwon, O.; **Ayla, E.Z.;** Tan, J.Z.; Flaherty, D.W.; "Effects of Hydrofluoric Acid Concentration on the Density of Silanol Groups and Water Adsorption in Hydrothermally Synthesized Transition Metal Substituted Silicalite-1" *Chemistry of Materials,* ***2020,*** 32, 17, 7425-7437.

Bregante, D.T.; Tan, J.Z.; Schultz, R.L.; Potts, D.S.; **Ayla, E.Z.;** Torres, C.; Flaherty, D.W.; "Catalytic Consequences of Oxidant, Alkene, and Pore Structure on Alkene Epoxidations within Titanium Silicates" *ACS Catalysis,* ***2020,*** 10, 17, 10169-10184.

Flores, A; Choi, Hyun; Martinez, Rodrigo; Onyeabor, Moses; **Ayla, E.Z.;** Godar, Amanda; Machas, Michael; Nielsen, D.R.; Wang, X.; *Frontiers in Bioengineering and Biotechnology,* **2020**, 8, 329.

Bregante, D.T.; Johnson, A.M.; Patel, A. Y.; **Ayla, E.Z.;** Cordon, M.J.; Bukowski, B.C.; Greely, J.; Gounder, R.; Flaherty, D.W.; "Cooperative Effects between Hydrophilic Pores and Solvents: Catalytic Consequences of Hydrogen-Bonding on Alkene Epoxidation in Zeolites" *Journal of the American Chemical Society,* **2019**, *141*, 7302 – 7319.

Flores, A.D.; **Ayla, E.Z.;** Wang, X.; Nielsen, D.R.; "Engineering a Synthetic, Catabolically Orthogonal Coculture System for Enhanced Conversion of Lignocellulose-Derived Sugars to Ethanol" *ACS Synthetic Biology,* **2019**, 8, 5, 1089 – 1099.

Presentations

Ayla, E.Z.; Patel, D.; Harris, A.; Flaherty, D.W.; "Identity of the Metal Oxide Support Controls Outer Sphere Interactions that Change Rates and Barriers for Alkene Epoxidations at Isolated Ti Atoms" 27th North American Catalysis Society Meeting **2022**; New York, NY - *Oral Presentation*

Ayla, E.Z.; Patel, D.; Harris, A.; Flaherty, D.W.; "Identity of the Metal Oxide Support Controls Outer Sphere Interactions that Change Rates and Barriers for Alkene Epoxidations at Isolated Ti Atoms" AIChE **2021**; Boston, MA – *Poster, Women in Chemical Engineering Travel Award*

Ayla, E.Z.; Potts, D.S.; Bregante, D.T.; Flaherty, D.W.; "Linear Free Energy Relationships for Alkene Oxidations with H_2O_2 over Groups 4 – 6 M-BEA" Catalysis Club of Chicago Symposium **2020**; Virtual – *Poster Presentation, Poster Prize Winner*

Ayla, E.Z.; Bregante, D.T.; Flaherty, D.W.; "Role of Electronic Properties of Active Metal in Alkene Oxidations with H_2O_2 over Groups 4 – 6 Substituted BEA Catalysts" International Congress of Catalysis **2020**; San Diego, CA – *Poster Presentation* (Canceled due to COVID-19)

Ayla, E.Z.; Bregante, D.T.; Flaherty, D.W.; “Reaction Pathways and Reactive Surface Intermediates Responsible for Alkene Oxidations with H_2O_2 over Groups 4-6 Metal-Substituted Zeolites” 26th North American Catalysis Society Meeting **2019**; Chicago, IL – *Oral Presentation*

Ayla, E.Z.; Bregante, D.T.; Flaherty, D.W.; “Reaction Pathways Responsible for Alkene Oxidations with H_2O_2 over Groups 4-6 M-BEA Catalysts” Catalysis Club of Chicago Symposium **2019**; Naperville, IL – *Poster Presentation*

Ayla, Z.; Bregante, D.T.; Flaherty, D.W.; “Green Epoxidations on Atomically Dispersed Groups 4-6 Metal Catalysts with H_2O_2” Catalysis Club of Chicago Symposium **2018**; Naperville, IL – *Poster Presentation*

Ayla, Z.; Flores, A.; Nielsen, D.; Wang, X.; “Engineering A Synthetic Co-Culture System for Enhanced Co-Utilization of Lignocellulose-Derived Sugar Mixtures” Honors Thesis Defense **2017**; Tempe, AZ – *Oral Presentation*