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Engineering & Scientific Consulting

Taylor Sulmonetti, Ph.D., P.E., CFEI

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Professional Profile

Dr. Sulmonetti is a chemical engineer whose areas of expertise include reaction and chemical process engineering, heterogeneous catalysis, environmental catalysis, emissions abatement technology, solid adsorbates, alternative energy processes materials characterization, and fire/explosion investigation. He applies the fundamentals of chemical engineering, chemistry, and material science to investigate failures or performance issues related to and chemical and catalytic processes.

Additionally, Dr. Sulmonetti conducts investigations involving fires, explosions, and chemical releases to aid in root cause analysis and improve process safety.

PROCESS DESIGN, ENGINEERING, AND SAFETY

Dr. Sulmonetti utilizes fundamental chemical engineering principles to evaluate a variety of technical challenges within the chemical processing industry. He has been involved in multiple large-scale disputes/arbitrations, both in the US and abroad, involving chemical processing plants. His analysis focuses on key components of chemical processes including reactor technology, raw material handling, piping, process control, and process safety equipment. Specifically, he has performed analyses and calculations to evaluate the proper scale-up of equipment from the pilot to the industry scale and to assess the performance of a specific process equipment. Finally, he has applied his experience in incident investigation to analyze equipment-specific and plant-wide process safety measures to reduce risk for his clients.

FIRES, EXPLOSIONS, AND CHEMICAL REACTIVITY

Dr. Sulmonetti is a Certified Fire and Explosions Investigator through NAFI and has also completed training in hazardous materials handling. From these trainings and knowledge garnered as a chemical engineer, he applies the fundamentals of chemistry and engineering science to conduct calculations and design laboratory experiments that test working hypotheses in relation to fires, explosions, and chemical releases. Dr. Sulmonetti has analyzed hazardous chemical exposure and releases that involved chemicals such as toxic gases, asphyxiants, corrosives, and oxidizers. Through his analysis, he has developed and opined as to probably root cause of industrial incidents and has applied these insights to improve future process safety. Additionally, he has conducted investigations to determine origin and cause of fires and explosions as the result of alleged propane releases.

REACTION ENGINEERING AND CATALYSIS

Dr. Sulmonetti has drawn upon his experience in reaction engineering to conduct failure analysis on numerous catalytic reaction systems. He applies the fundamental principles of reactor design, kinetic analysis, and surface chemistry to evaluate reaction processes, including the formulation, performance, and deactivation of catalytic materials. He has significant experience in designing, constructing, and

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operating lab-scale catalytic reactors that can be utilized to evaluate performance and/or deactivation of catalysts. Most notably, his work has involved evaluating emissions abatement technologies including diesel emissions after-treatment systems and catalysts. He has extensive experience in analyzing selective catalytic reduction (SCR) processes, oxidation catalysts, and zeolites. Additionally, Dr. Sulmonetti's research involves catalytic material characterization which can elucidate structure-to-reactivity relationships which are critical in root cause analysis of catalytic performance and deactivation.

As a Graduate Research Assistant at Georgia Tech, Dr. Sulmonetti synthesized, characterized, and analyzed non-precious, multi-metal catalysts utilized in the conversion of key biomass platform molecules into renewable fuel additives and plastic precursors. He gained extensive experience in reaction engineering including designing and testing lab-scale batch reactors and vapor phase flow reactors, along with product analysis through gas chromatography (GC). Additionally, he has significant experience with material characterization techniques including X-ray photoelectron spectroscopy (XPS), X-ray absorption spectroscopy (XAS), X-ray diffraction (XRD), differential scanning calorimetry (DSC), thermogravimetric analysis (TGA), and transmission electron microscopy (TEM). All these experiences have been used to assist clients in evaluating their catalytic systems ranging from the nanoscale to the industrial scale.

Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, Georgia Institute of Technology, 2017

B.S., Chemical Engineering, Lehigh University, 2013

Georgia Institute of Technology Leadership Fellow, 2016-2017

Licenses and Certifications

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

Certified Fire and Explosion Investigator (CFEI)

Prior Experience

Engineering Intern - Freestyle Division, Coca-Cola, Summer 2012

Polymer Research Intern, NASA's Langley Research Center, Summer 2011

Professional Affiliations

American Institute of Chemicals Engineers – AIChE (member)

- *Advances in Catalysis*, Session Chair, Spring 2022

National Association of Fire Investigators – NAFI (member)

FiltExpo – Session Chair, 2019

Publications

Berry EG, Bezecny J, Acton M, Sulmonetti TP, Anderson DA, Beckham HW, Durr RA, Chiba T, Beem J, Brash D, Kulkarni R, Cassidy PB, Leachman SA. Slip versus Slop: a head-to-head comparison of UV-protective clothing to sunscreen. Cancers 2022; 14(3): 542-560.

Vieira LH, Possato LG, Chaves TF, Lee JJ, Sulmonetti TP, Jones CW. Insights into redox dynamics of vanadium species impregnated in layered siliceous zeolitic structures during methanol oxidation reactions. ChemCatChem 2020; 12(1), 141-151.

Mahamular S, Yin K, Sulmonetti TP, Kwon HT, Davis RJ, Li L, Shibata H, Malek A, Jones CW, Agrawal PK. α-Alumina supported doped ceria catalysts for steam gasification and oxidation of radical coke. Chemical Engineering Research and Design 2019; 151: 1-9.

Golub KW, Sulmonetti TP, Darunte LA, Shealy MS, Jones CW. Metal-Organic-Framework-Derived Co/Cu-Carbon Nanoparticle Catalysts for Furfural Hydrogenation. ACS Applied Nano Materials 2019; 2(9): 6040-6056.

Yang SC, Pang SH, Sulmonetti TP, Su WN, Lee JF, Hwang BJ, Jones CW. Synergy between Ceria Oxygen Vacancies and Cu Nanoparticles Facilitates the Catalytic Conversion of CO2 to CO under Mild Conditions. ACS Catalysis 2018; 8(12): 12056-12066.

Kwon HT, Bukhovko MP, Mahamulkar S, Sulmonetti TP, Min B, Almas Q, Malek A, Agrawal PK, Jones CW. Sol-gel derived CeO_2/α-Al_2O_3 bilayer thin film as an anti-coking barrier and its catalytic coke oxidation performance. AIChE Journal 2018; 64(11): 4019-4026.

Sulmonetti TP, Bo H, Lee S, Agrawal PK, Jones CW. Reduced Cu-Co-Al Mixed Metal Oxides for the Ring-Opening of Furfuryl Alcohol to Produce Renewable Diols. ACS Sustainable Chemical Engineering 2017; 5(10): 8959-8969.

Bo H, Kim WG, Sulmonetti TP, Sarazen ML, Tan S, So J, Moore JS, Liu Y, Dixit RS, Nair S, Jones CW. Mesoporous $CoAl_2O_4$ Spinel Catalyst for Non-Oxidative Propane Dehydrogenation. ChemCatChem 2017; 9(17): 3330-3337.

Sulmonetti TP, Bo H, Ifkovits Z, Lee S, Agrawal PK, Jones CW. Selective Hydrogenolysis of Furanics Utilizing Reduced Cobalt Mixed Metal Oxide Catalysts. ChemCatChem 2017; 9(10): 1815-1823.

Sulmonetti TP, Pang S, Claure MT, Lee S, Cullen D, Agrawal PK, Jones CW. Vapor Phase Hydrogenation of Furfural over Nickel Mixed Metal Oxides. Applied Catalysis A: General 2016; 517: 187-195.

Presentations

Oral Presentations

Sulmonetti TP, Dee S, Hietala D. Hazard Identification and Risk Analysis for Retrofitting a Biorefinery. AIChE Spring Meeting and Global Congress on Process Safety, Virtual, 2020.

Sulmonetti TP. Chemical Based Pretreatments of Lignocellulosic Biomass. International Biomass Conference and Expo. Savannah, GA, 2019.

Sulmonetti TP, Agrawal PK, Jones CW. Tunable Mixed Metal Oxides for the Selective Hydrogenation and Ring-Opening of Furfuryl Alcohol. AIChE National Meeting, Minneapolis, MN, 2017.

Sulmonetti TP, Bo H, Ifkovits Z, Lee S, Agrawal PK, Jones CW. Selective Hydrogenolysis of Furfuryl Alcohol to 2-Methylfuran Over Reduced Co-Fe-Al Mixed Metal Oxides. AIChE National Meeting, San Francisco, CA, 2016. - Session's Best Presentation

Sulmonetti TP, Bo H, Lee S, Agrawal PK, Jones CW. Ring-Opening of Furfuryl Alcohol Towards 1,5-Pentanediol Over Reduced Cu-Co-Al Mixed Metal Oxides. AIChE National Meeting, San Francisco, CA, 2016. - Session's Best Presentation

Sulmonetti TP, Agrawal PK, Jones CW. Hydrogenation and Hydrogenolysis of Furanics Utilizing Non-Precious Mixed Metal Oxides. Southeastern Catalysis Society Symposium, Asheville, NC, 2016.

Sulmonetti TP, Pang S, Claure MT, Lee S, Cullen D, Agrawal PK, Jones CW. Vapor Phase Hydrogenation of Furfural Utilizing Nickel Mixed Metal Oxides. AIChE National Meeting, Salt Lake City, UT, 2015.

Poster Presentations

Sulmonetti TP, Agrawal PK, Jones CW. Tunable Mixed Metal Oxides for the Selective Hydrogenation and Ring-Opening of Furfuryl Alcohol. North American Catalysts Society Meeting, Denver, CO, 2017.

Sulmonetti TP, Pang S, Claure MT, Lee S, Cullen D, Agrawal PK, Jones CW. Vapor Phase Hydrogenation of Furfural Utilizing Nickel Mixed Metal Oxides. International Congress on Catalysis, Beijing, China 2016.