CURRICULUM VITAE

Tracy John Benson

EMPLOYMENT

7/22– present	Chair, Dan F. Smith Departmentof Chemica& BiomolecularEngineering Jack Gill Endowed Chair LamarUniversity
9/22– present	Full Professor Dan F. Smith Departmentof Chemica& BiomolecularEngineering Lamar University
6/21-7/22	Interim Chair Dan F. Smith Departmentof Chemical& BiomolecularEngineering
9/15- 8/22	AssociateProfessor(tenured) DanF. SmithDepartmentof ChemicalEngineering Lamar University
9/19– 10/20	AssociateDirector of Research Centerfor MidstreamManagementandScience Lamar University
8/09– 8/15	AssistantProfessor DanF. SmithDepartmentof ChemicalEngineering Lamar University
2/08-8/09	PostdoctoraResearclAssociate DaveC. SwalmSchoolof ChemicalEngineering Mississippi State University
1/04-12/07	Ph.D.Candidate-ChemicalEngineering,MississippiStateUniversity
8/00-12/03	M.S. Student- Chemical Engineering, Mississippi State University
1/98-8/99	Co-op Engineer (1 year experience), G.E. Plastics, Bay St. Louis, MS

EDUCATION

High School,1993,Houston HighSchoolin Houston,MS

- 2019–2022–MemberUniversityUndergraduateurriculumCommitteeLU
- 2018-2021- Chair, Admissions Committee, LU
- 2018-2021-Undergraduat Research Advisory Board, LU
- 2017-2020- Jack Gill Distinguished Faculty Fellowship
- 2016-2019-Member Graduate Council, LU
- 2015–2019–GraduateCoordinator,Dan F. SmithDepartment ChemicalEngineering
- 2013–2019– Chair, Unit Operations Laboratory Renovation and Modernization
- 2018–2019–Coordinator, Graduate Programs, Collegeof Engineering
- 2012- Present- Faculty Advisor, AIChE Student Chapter
- 2010-Present-ChemECarSafetyCoordinatorAIChE SouthwesStudentRegion
- 2018– Member F2.08 Faculty Annual Review Committee, College of Engineering
- 2018- Chair, AIChE Student Chapters Committee
- 2018- Facultyleader,EngineeringStudyAbroadin India
- 2018- Chair, SearchCommitteeDepartmentAdministrativeAssistant
- 2017- Chair, Faculty Search Committee
- 2017-InternationaGraduateStudentRecruiterfor LamarUniversity
- 2017- Faculty Externship Motiva Enterprises Inc.
- 2017-Vice Chair, AIChE StudentChaptersCommittee
- 2017– TechnicalAdvisor/SafetyConsultanfor AIChE Middle EastRegionalChemECar Competition in Bahrain
- 2017– Co-ChairAIChE SouthwesProcessTechnologyConferenceStudentProgram Leadership
- 2017- Chair AOCS Industrial Oil Products Poster Session
- 2016-2nd Vice Chair AIChE Student Chapters Committee

- 2016- Chair, Advances in Catalysissessionat the AIChE springconference in Houston, TX
- 2015– TechnicalAdvisor/SafetyConsultanfor AIChE Middle EastRegionalChemECar Competition in Bahrain
- 2015- Chair, AIChE SustainabilityEngineeringForumandareaplenarysession

2015-

- 2007-FirstplaceDaveCSwalmSchoolofChemicalEngineeringstudentpapercompetition
- 2007-Hearin Fellowship Recipient
- 2007– Third placeposterpresentationawardat the studentpostercompetition for the 2007 Mississippi Academy of Sciences annual conference
- 2007– Co-chair, Biorefineriessessionat the 98th annualAmericanOil Chemists' Society conference held in Quebec, Canada
- 2006– Delegateat the 27th annualCouncil for ChemicalResearchmeeting. This delegation arose from an essay writing competition.
- 2005– SearchCommitteememberfor theDirector of theDaveC. SwalmSchool of Chemical Engineering at Mississippi State University

K 12 OUTREACH

- LamarIntro To Engineering(LITE) weeklongJuniorHigh summercamp2014current); sponsored by state and industrial grants
- CampChemE– weeklongHigh schoolsummercamp(2023);sponsoredby local chemical industry
- (~400 ProjectEngineer(formerly LITE Senior)– weeklongHigh Schoolsummercamp(120 students 2017/2018); sponsored by industrial support
 - Introducea Girl to Engineering- Annualdaylongeventwith handson demonstrations; sponsored by ExxonMobil
 - DiscoverEngineering-K-6th annualevent(~400studentsperyear2014-2023)
 - Collegeof EngineeringSTEM workshop– TeacherandAdministrators(50 100per year 2015 2023); sponsored by BASF
 - SoutheasTexasCareerExpo- Demonstration

CHEN 6347– AdvancedThermodynamic\$Spring'12 – '17, Spring '19 – '21) CHEN 5301– IndustrialChemicalCatalysis(Spring'10 & '11, Summer'14) CHEN 1101– Introductionto Chemical Engineerin\$Fall '17 – '24, Spring'19 – '24) CHEN 3340– Process Analysis (Fall '21 – '22, Spring '22) ENGR 4301– CarbonCaptureUtilization & Storage(Fall '22) ENGR 4301– Industrial Chemical Catalysis (Fall '23)

MississippiStateUniversity

CHE 3223– MassTransfer(Spring'09) CHE 6000– Bio-analyticalResearclMethods(Fall '08) CHE 3203– Fluid Flow Operations (Fall '06)

RESEARCH GRANTS (funded)

"Biodiesel Production via Transmethylation of Triglycerides: A Glycerol-free Biofuel," Project supported by the Texas Hazardous Waste Research Center, FY 2010 (\$15,000), FY 2011 (\$18,250)– PI.

"Temperature Programme@Desorption(TPD) Studyfor a CO₂ SequestratioCatalyst" Project supported by Lamar University REG, (\$5,000).

"Hydrotreating Phospholipids:DevelopingtheBiorefineryfor Microbial Oils" Projectsupported by the Texas Hazardous Waste Research Center, FY2013 (\$20,7000)

"Heterogeneous Catalyst Development for the Conversion of Phospholipid-Containing Feedstockso Renewable Transportation Fuels" Projects upported by the Texas Hazardous Waste Research Center, FY2012015 (\$30,000) Pl.

"In Situ RamanStudyfor a RenewableFuelsCatalyst" Projectsupportedby LamarUniversity REG, FY2014 (\$5,000) PI.

"MRI: Acquisition of an LC/MS/MS Systemfor Multidisciplinary Researchand EducationaProjects" Projectsupportedby NSF-MRI, FY2014-FY2016(\$456,549)- Senior Personnel

"Lamar Introduction to Engineering (LITE)" Project supported by Texas Higher Education CoordinatingBoardfor junior high schoolengineeringsummercampFY2014(\$12,500)-PI.

"Lamar Introduction to Engineering (LITE)" Project supported by Texas Higher Education CoordinatingBoardfor junior high schoolengineeringsummercampFY2015(\$13,998)–PI.

"Lamar Introductionto Engineering(LITE)" Projectsupportedby ExxonMobil for junior high school engineering summer camp FY2015 (\$15,0070)

"Direct PhotocatalyticConversion CO₂-ContainingFlueGases" Projectsupported y Texas Air Research Center, FY20172018, (\$33,450) PI.

"Development and Testingof Amine-Type Scavengerfor the Removalof H₂S from Liquid Sour Crudes" Project Supported by Texas Hazardous Waste Research Center FY2016 – 2018, (\$23,000)– PI.

"Lamar I R /

FrankLopez(MS) – "Kinetic Evaluation of Lipid Oil Conversion Biofuel UsingLayered Double Hydroxide Doped with Triazabicyclodecene Catalyst" (Graduated Dec 2016)

Mihir Kulkarni (MS) – "Synthesis and Characterization f Supported Nickel Nanoparticles Titanium Dioxide Using Reverse Micelles" (Graduated May 2017)

Ashik Mahmud(MS) – "A Parametric Analysis for the Formation of Nano-particle Catalyst Sites Using Reverse Micelle Synthesis Techniques" (Graduated Dec 2017)

Adeniji Adetayo (MS)– "Evaluation of the Intraparticle Mobility of Group I, II, and VIIIB Poisonsin FluidizedCatalyticCrackingCatalystsUnderReactionConditions" (GraduateDec 2017)

ObakoreAgbroko(MS) "Reactive Distillation for the Production of Propanediols from Glycerol" (expected graduation: May 2022)

GautamSinghThakur(MS) "Reactor Performance for Tri-ReformingUnderRealConditions" (expected graduation: Dec. 2021)

JuanCruz (PostDoctoralResearchAssociate) - Researchincludedfundamentachemistries for the reverse micelle formation and subsequent use for nanoparticlemetaticatalysts.

AdhishSakethMadugula(PostDoctoralResearchAssociate)-Researchincludedsynthesisand testing of ionic liquids for carbon capture

REFEREED PUBLICATIONS

1. Benson, T. andGeorge, C. (2005), "Cellulose BasedAdsorbentMaterialsfor theDehydration of Ethanol Using Thermal Swing Adsorption," Adsorption Journal, 11, 697 – 701. http://link.springer.com/article/10.1007%2Fs1043335-60091

2. **Benson, T**., Hernandez, R., French, W.T., Alley, E.G., and Holmes, W.E. (2007) "Reactions of Fatty Acids in SuperacidMedia: Identification of Equilibrium Products," Journalof Molecular Catalysis A: Chemical, 274, 173178. <u>http://dx.doi.org/10.1016/j.molcata.2007.05.003</u>

3. **Benson, T.,** Holmes,W.E., White, M.G., French,W.T., Alley, E.G, Hernandez, R. (2007) "Development of a Heterogeneous Catalytic Cracking Reactor Utilizing Online Mass Spectrometry Analysis," Journal of Chromatography A, 1172, 204 – 208. https://www.sciencedirect.com/science/article/pii/S0021967307016196

4. **Benson, T.**, Holmes,W.E., White, M.G., French,W.T., Alley, E.G., and Hernandez R. (2008) "Heterogeneous Crackingof an Unsaturate Fatty Acid and Reaction Intermediates MH⁺ZSM-5 Catalyst," Clean – Soil, Air, Water, 36, 652–656. <u>http://onlinelibrary.wiley.com/doi/10.1002/clen.200800050/abstract</u>

25. Piler, K., Watters, J**Benson, T.J.** (2020) "Band Gap Tuning of TiO₂ NP-SWCNT Nanocomposite Materials Using Surfactan Synthesis Techniques" Materials Letters, 278, 128410. https://doi.org/10.1016/j.matlet.2020.128410

26. Piler, K., Bahrim, C., Sylvestre Twagiraye **Benson**, **T.J.** (2020) "Lattice Disorders of TiO₂ and Their Significance in the Photocatalytic Conversion of CO₂" Advances in Catalysis,V 66, Chapter 2<u>h(ttps://doi.org/10.1016/bs.acat.2020.09)</u>001

27. Madugula, A.C.S., Sachde, D., Hovorka, S.D., Meckel, **TBAnson, T.J.** (2021) "Estimation of CO₂ Emissionsfrom PetroleumRefineriesBasedon the Total OperableCapacity form Carbon Capture Applications" Chemical Engineering Journal Advances, 18, 100162. <u>https://doi.org/10.1016/j.ceja.2021.100</u>162

28. Madugula,A.C.S., Jeffreys,C., Henry,J., **Benson, T.J.** (2024)"A Simulation-BasedModel Studying Monoethanolaminænd AproticHeterocyclicAnion IonicLiquid (AHA-IL) Mixtures for Carbon Capture" Computers and Chemical Engineering, 183, 108599. https://doi.org/10.1016/j.compchemeng.2024.108599

29. Doan, L., Elgar, K., Rahman, **ABenson, T.J.** "Evaluation of Infinite Dilution Activity Coefficients for HydrogenSulfideAbsorptionin Butyl-MethylimidazoliumTypeIonicLiquids" (in preparation)

30. Doan, L., Elgar, K., Rahman, A., **Benson, T.J.** "Towards the StructurePropertyRelationship Between Hydrogen Sulfide and BufylethylimidazoliumType Ionic Liquids" (in preparation)

PATENTS

U.S.PATENT#: 10,316,254 Hydrothermal Synthesis f Alkali Promoted

- 26 June 2002- "Innovative Adsorbents for the Dehydration of Ethanol" Presented the results of master's thesis project at the 18th Annual International Fuel Ethanol Workshop and Tradeshow in Springfield, IL.
- 5. 25 March 2003- "Separation of Ethanol from Fermenter Effluents" Presented information on the process of distillation and dehydration of fermented ethanol at the 2003 Mississippi Biomass Conference in Jackson, Ms.
- 6. 19 November 2003 "Development of New Adsorption Materials for the Dehydration of Ethanol" Presented results from master's thesis project at the 2003 Annual AICHE conference in San Francisco, CA.
- 7. 9 November 2004 "Producing Electric Power from Broiler Litter" Presented at the 2004 Annual AICHE conference in Austin, TX.
- 8. 1 November 2005 "Production of Biodiesel from Lipid-Rich Industrial Waste Streams" Presented at the 2005 Annual AICHE conference in Cincinnati, OH.
- 9. 15 November 2006 "Cracking of Lipid Molecules by a Superacid" Presented at the 2006 Annual AICHE conference in San Francisco, CA.
- 10. 28 March 2007– "Product identification from the catalytic cracking of *cis*-9-octadecenoic acid" Presented at the 233ACS National Meeting and Exposition in Chicago, IL.
- 11. 14 May 2007– "Online Mass Spectrometry Analysis of a Catalytic Cracking Reactor." Presented at the 98Annual AOCS Meeting & Expo in Quebec City, QC.
- 12. 16 May 2007– "Cracking of Fatty Acids Over H-ZSM-5 Catalyst: Elucidation of Reaction Mechanisms" Presented at the 98Annual AOCS Meeting & Expo in Quebec City, QC.
- 13. 27 August 2007- "Catalytically Cracking of Unsaturated Lipids of H-ZSM-5" Presented at the 2007 Mississippi State University Biofuels Conference.
- 9 November 2007– "Identification of The Cracking Mechanism of Mono-, Di-, and Triglycerides Over #Zsm-5 Catalyst" – Presented at the 2007 annual AICHE conference in Salt Lake City, UT.
- 15.20 May 2008- "Elucidation of Mechanism for the Cracking of Unsaturated Lipids Using a BenchmarkCatalystandCommerciaCatalysts" Presented the 98th Annual AOCS Meeting & Expo in Seattle, WA.
- 16.2 June2008– "Catalytic CrackingReactionPathwayfor UnsaturatedAcylglycerideson a Benchmark Catalyst and Commercial Catalysts" Presented at the Clean Technology and Sustainable Industries Conference and Trade Show in Boston, MA.

29. 15 June 2010 "Development of an Ideal Hydrotreating Catalyst for the Conversion of Phospholipid**s**o Biofuels." Presente**d**t the 21st InternationalSymposiumfor Chemical

- 42.1 Nov 2012– "In Situ FTIR Identification of the Reactive Sites of a Ni/TiO2 Steam ReformingCatalyst" Presented tannualAIChE conference Pittsburg,PA by (Presented by Yishan ZhangPhD student)
- 43.1 Nov 2012– "Simulation and Heat-Integration of GlyceroFree Biodiesel Plant from CanolaOil with Dimethyl Carbonate" Presented tannuaAIChE conference Pittsburg, PA by (Presented by Mohammad Rafiqul IslamD student)
- 44.25 Sept2013– "Catalytic and Proces Developmentor Glycerol-free Biofuel from Lipids" Presented to Renewable Biofuels, Inc. (invited talk)
- 45.3 Nov 2013- "Kinetic Evaluation and Reactor Modeling for Transesterification of Lipids with Dimethyl Carbonate Jsing the Homogeneou Satalyst Triazabicyclodecene" Presented at annual AIChE conference in San Francisco, CA.
- 46.4 Nov 2013– "Experience Using Inexpensive/WaterOverflow Experimentto Demonstrate SIS Concepts" Presented annualAIChE conference SanFrancisco,CA. (Presented y colleague Dr. Peyton Richmond)
- 47.7 Nov 2013- "Development of a Heterogeneou Guanidine Base Catalystfor

- 54. 9 Nov 2015– "Carbon Dioxide ConversionCatalyzingthe ReactionandSociety's Interest" Presented at the Area Plenary session of Health, Safety & Environmental Sustainability at AIChE annual conference in Salt Lake City, UT
- 55.11 Nov 2015- "A Parametric Study for the Conversion of High Free Fatty Acid Lipid Feedstockso Biofuel Using Triazabicyclodecen Catalyst" Presented t AIChE annual conference in Salt Lake City, UT (Presented by Obakore Agb Poko student)
- 56. 26 Aug 2016– "Carbon Dioxide ConversionThroughTri-Reforming:Reactor/Process Design and Optimization" Presented at the Southeast Symposium on Contemporary Engineering Topics in Jackson, MS
- 57. 15 Nov 2016- "Development and Testing of Amine-Type Scavengers for the Removal of H₂S from Liquid SourCrudes" Presented tAIChE annualconference SanFrancisco,CA (Presented by Obakore AgbroRbD Student)
- 58. 17 Nov 2016– "In Situ Analysisfor the Production of Biofuel Using a Heterogeneous Layered Double Hydroxide Catalyst" Presented at AIChE annual conference in San Francisco, CA (Presented by Obakore Agbr**BktD** Student)
- 59.3 May 2017- "Reactive Distillation: Exploring ProcessIntensificationRoutesfor the Oil

- 66.18 July 2019– "Exploring the Gulf of Mexico Sub-SeaFloor as a Sink for WasteCO₂," Presented at the Carbon Management Conference in Houston, TX.
- 67.12 Nov 2019- "Unique Preparation of TiO

MoniqueWilburn (PhD) "Methane OxidationOver, and Sulfur Interactionswith, Pd/Pt Bimetallic Catalysts" Defended Dec 2017 (University of Houston)

MelanieHazlett(PhD)