

# Thomas H. Fletcher

## Books and Book Chapters

1. Smith, L. K., L. D. Smoot, T. H. Fletcher, and R. J. Pugmire, "Chapter 3. Coal Characteristics, Structure, and Reaction Rates," in Fundamentals of Coal Combustion for Clean and Efficient Use, edited by L. D. Smoot, Elsevier, New York (1993).
2. Smith, L. K., L. D. Smoot, T. H. Fletcher, and R. J. Pugmire, The Structure and Reaction Processes of Coal, Plenum Press, New York (1994).
3. Liu, K., Z. Cui, and T. H. Fletcher, "Chapter 4. Coal Gasification," in H<sub>2</sub> and Syngas Production and Purification Technologies, edited by K. Liu, C. Song, and V. Subramani, AIChE and Wiley, Hoboken, New Jersey, pp. 156-218 (2010).
4. Fletcher, T. H., R. J. Pugmire, M. S. Solum, C. L. Mayne, A. M. Orendt, and J. C. Facelli, "Chapter 5: Chemical and Structural Characterization of Oil Shale from the Green River Formation," in Utah Oil Shale: Science, Technology, and Policy Perspectives, edited by J. Spinti, CRC Press, Boca Raton, FL, pp. 87-117 (2017). ISBN-13: 978-1-4987-2172-1
5. Fletcher, T. H., R. J. Pugmire, M. S. Solum, C. L. Mayne, "Chapter 6: Oil Shale Pyrolysis Rates and Mechanisms," in Utah Oil Shale: Science, Technology, and Policy Perspectives, edited by J. Spinti, CRC Press, Boca Raton, FL, pp. 119-156 (2017). ISBN-13: 978-1-4987-2172-1
6. Fletcher, T. H., "Chapter 6. Gasification Fundamentals," in Introduction to Gasification for IGCC Systems, edited by T. Wang and G. Stiegel, Woodhead Publishing, pp. 223–256 (2017). ISBN-13: 978-0-0810-0167-7

## Peer-Reviewed Journal Articles (in reverse chronological order)

123. Gallacher, J. R., V. Lansinger, S. Smith, A. Doll, D. R. Weise, and T. H. Fletcher, "Effects of Season on the Ignition and Burning of Live Wildland Fuels Using a Flat-Flame Burner System," submitted to the *International Journal of Wildland Fire* (Dec., 2016).
122. Shen, C., M. E. Fletcher, J. R. Gallacher, T. Adams, C. A. Seielstad, and T. H. Fletcher, "Geometrical Construction of Chamise and Big Sagebrush Shrubs using L-Systems Guided by LiDAR," submitted to *Annals of Botany* (May, 2017).
121. Yang, H., T. H. Fletcher, Y. Li, L. Jin, S. Li, Y. Shang, H. Hu, "Modeling the Influence of Changes in Aliphatic Structure on Char Surface Area during Coal Pyrolysis," accepted, 37<sup>th</sup> International Symposium on Combustion, Dublin, Ireland (July 29-August 3, 2018).
120. Safdari, M-S., M. Rahmati, E. Amini, J. E. Howarth, J. P. Berryhill, T. H. Fletcher, and D. R. Weise, "Characterization of Pyrolysis Products from Fast Pyrolysis of Live and Dead Vegetation," accepted, *Fuel* (May, 2018).
119. Rahmati, M., B. Huang, L. M. Schofield, T. H. Fletcher, B. F. Woodfield, W. C. Hecker, C. H. Bartholomew, and M. D. Argyle, "Effects of Ag Promotion and Preparation Method on Fischer-Tropsch Activity and Selectivity Properties of Cobalt Supported Catalysts on Silica-doped Alumina," *Journal of Catalysis*, **362**, 118-128 (2018).
118. Laycock, R. G. and T. H. Fletcher, "Formation of Deposits from Heavy Fuel Oil Ash in an Accelerated Deposition Facility at Temperatures up to 1219°C," *Fuel Processing Technology*, **175**, 35-43 (2018).

117. Weise, D. R., T. H. Fletcher, W. Cole, S. Mahalingham, X. Zhou, L. Sun, and J. Li, "Fire Behavior in Chaparral – Evaluating Flame Models with Laboratory Data," *Combustion and Flame*, **191**, 500-512 (2018)
116. Laycock, R. G. and T. H. Fletcher, "Erratum to "Erratum: 'Time-Dependent Deposition Characteristics of Fine Coal Fly Ash in a Laboratory Gas Turbine Environment' [ASME J. Turbomach., 2012, 135(2), p. 021003; DOI:10.1115/1.4006639]" ASME. J. Turbomach. 2017; 139(12):127001-127001-2. doi:10.1115/1.4037911," *ASME J. Turbomachinery*, **140**(4), 047001-047001-1 (2018).
115. Gallacher, J. R., B. Ripa, B. Butler, and T. H. Fletcher, "Lab-Scale Observations of Flame Attachment on Slopes with Implications for Firefighter Safety Zones," *Fire Safety Journal*, **96**, 93-104 (2018).
114. Rahmati, M., B. Hong, M. K. Mortenson, K. Keyvanloo, W. C. Hecekr, T. H. Fletcher, and M. D. Argyle, "Effect of Different Alumina Supports on Performance of Cobalt Fischer-Tropsch Catalysts," *Journal of Catalysis*, **359**, 92-100 (2018).
113. Laycock, R. and T. H. Fletcher, "Errata to 'Time-Dependent Deposition Characteristics of Fine Coal Flyash in a Laboratory Gas Turbine Environment' (*J. Turbomach.* 2012;135(2):021003-021003-8. doi:10.1115/1.4006639)," *Journal of Turbomachinery*, **139**(12):127001-127001-2 (2017). DOI: 10.1115/1.4037911
112. Holland, T., S. Bhat, P. Marcy, J. Gattiker, J. D. Kress, and T. H. Fletcher, "Modeling Effects of Annealing on Coal Char Reactivity to O<sub>2</sub> and CO<sub>2</sub> Based on Preparation Conditions," *Energy and Fuels*, **31**, 10727-10744 (2017). DOI: 10.1021/acs.energyfuels.7b01888
111. Josephson, A. J., N. D. Gaffin, S. T. Smith, T. H. Fletcher, D. O. Lignell, "Modeling Soot Oxidation and Gasification with Bayesian Statistics," *Energy & Fuels*, **31**, 11291-11303 (2017). DOI: 10.1021/acs.energyfuels.7b00899
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109. Yang, H., T. H. Fletcher, S. Li, H. Hu, and Y. Li, "Model for the Evolution of Pore Structure in a Lignite Particle during Pyrolysis : 2. Influence of Cross-linking Reactions, Molten Metaplast and Molten Ash on Particle Surface Area," *Energy and Fuels*, **31**, 8036-8044 (2017). DOI: 10.1021/acs.energyfuels.7b01163
108. Holland, T. and T. H. Fletcher, "A Comprehensive Model of Single Particle Pulverized Coal Combustion Extended to Oxy-coal Conditions," *Energy and Fuels*, **31**, 2722–2739 (2017). DOI: 10.1021/acs.energyfuels.6b03387
107. Prince, D. R., C. Shen, and T. H. Fletcher, "Semi-empirical Model for Fire Spread in Shrubs with Spatially-defined Fuel Elements and Flames," *Fire Technology*, **53**, 1439–1469 (2017). DOI: 10.1007/s10694-016-0644-9
106. Mohammad-S. Safdari, H.-R. Kariminia, Z. G. Nejad, and T. H. Fletcher, "Study Potential of Indigenous Pseudomonas Aeruginosa and Bacillus Subtilis in Bioremediation of Diesel-contaminated Water," *Water, Air, & Soil Pollution*, **228**:37, 1-7 (2017). DOI 10.1007/s11270-016-3220-5
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100. Fletcher, T. H., D. Barfuss, and R. J. Pugmire, “Modeling Light Gas and Tar Yields from Pyrolysis of Green River Oil Shale Demineralized Kerogen Using the CPD Model,” *Energy & Fuels*, **29**, 4921-4926 (2015). DOI: 10.1021/acs.energyfuels.5b01146
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1. Pugmire, R. J. and T. H. Fletcher, "An Overview of Thrust Area 1," presented at the 9th Annual ACERC Conference, Provo, Utah (April 5-6, 1995).
2. Fletcher, T. H., T. K. Gale, and C. H. Bartholomew, "Changes in Diameter and Surface Areas of Chars During Pyrolysis at Heating Rates, Temperatures, and Steam Concentrations Typical of Commercial Combustion Environments," presented at the 9th Annual ACERC Conference, Provo, Utah (April 5-6, 1995).
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4. Chen, W., Smoot, L. D., S. C. Hill, and T. H. Fletcher, "An Improved NO<sub>x</sub> submodel with Reburning," presented at the 9th Annual ACERC Conference, Provo, Utah (April 5-6, 1995).
5. Watt, M. and T. H. Fletcher, "Coal Nitrogen Chemistry in Coal," poster presented at the 9th Annual ACERC Conference, Provo, Utah (April 5-6, 1995).
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8. Flores, D. V. and T. H. Fletcher, "A Two Mixture Fraction Approach for Modeling Turbulent Combustion of Coal Volatiles and Char Oxidation Products," poster presented at the 9th Annual ACERC Conference, Provo, Utah (April 5-6, 1995).
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15. Fletcher, T. H. and D. Genetti, "Predicting  $^{13}\text{C}$  NMR Measurements of the Chemical Structure of Coal Based on Proximate and Ultimate Analysis," oral and poster presentation at the 11th Annual ACERC Conference, Provo, Utah (March 12-13, 1997).
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61. Zeng, D., and T. H. Fletcher, "High Pressure High Temperature O<sub>2</sub>-Char Reactivity Experiments," oral presentation at the 20<sup>th</sup> Annual ACERC Conference, Provo, Utah (February 16-17, 2006).
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73. Hillier, J. and T. H. Fletcher, "Kinetics of Kerogen Extracted from Green River Oil Shale Measured at Different Pressures," oral presentation and poster at the 22<sup>nd</sup> Annual ACERC Conference, Provo, Utah (February 26-27, 2008).
74. Shurtz, R., D. Johnson, T. H. Fletcher, M. S. Solum, and R. J. Pugmire, "Soot Formation from Coal Tar Surrogates under Gasification Conditions," oral presentation and poster at the 22<sup>nd</sup> Annual ACERC Conference, Provo, Utah (February 26-27, 2008).
75. Sowa, J., K. Kolste, and T. H. Fletcher, "Investigation of Nitrogen Release during Pyrolysis in an Oxycombustion Process," oral presentation and poster at the 22<sup>nd</sup> Annual ACERC Conference, Provo, Utah (February 26-27, 2008).
76. Pickett, B. M., C. Isackson, R. Miller, T. H. Fletcher, B. W. Butler, and D. R. Weise, "Burning Characteristics of Multiple Moist Forest Fuel Samples," poster presented at the 22<sup>nd</sup> Annual ACERC Conference, Provo, Utah (February 26-27, 2008).
77. Ai, W., S. Harding, R. Laycock, N. Murray, D. Rappleye, T. H. Fletcher, and J. P. Bons, "Computational Analysis of Conjugate Heat Transfer and Particulate Deposition Prediction," oral presentation and poster at the 23<sup>rd</sup> Annual ACERC Conference, Provo, Utah (February 23-24, 2009).
78. Cole, W. J., B. M. Pickett, and T. H. Fletcher, "A Semi-empirical Multi-leaf Model for Fire Spread through a Manzanita Bush," oral presentation and poster at the 23<sup>rd</sup> Annual ACERC Conference, Provo, Utah (February 23-24, 2009).
79. Sowa, J., K. Kolste, and T. H. Fletcher, "Investigation of Nitrogen Release during Coal Pyrolysis in an Oxyfuel Combustion Process," oral presentation and poster at the 23<sup>rd</sup> Annual ACERC Conference, Provo, Utah (February 23-24, 2009).
80. Hillier, J. and T. H. Fletcher, "An Improved Method for Determination of Kinetic Parameters from Constant Heating Rate TGA Oil Shale Pyrolysis Data," oral presentation and poster at the 23<sup>rd</sup> Annual ACERC Conference, Provo, Utah (February 23-24, 2009).
81. Shurtz, R., D. Johnson, D. Prince, J. Van Wagoner, G. Sorenson, and T. H. Fletcher, "A Pressurized Flat-Flame Burner for Gasification Studies," poster at the 23<sup>rd</sup> Annual ACERC Conference, Provo, Utah (February 23-24, 2009).
82. Kim, R., K. Kolste, C. Jeon, J. Song, and T. H. Fletcher, "Nitrogen Release during Devolatilization in Coals Utilized in Korea," poster at the 23<sup>rd</sup> Annual ACERC Conference, Provo, Utah (February 23-24, 2009).
83. Adams, C., T. H. Fletcher, K. Fowers, D. Hinckley, B. Alexander, C. Moss, "The CHESS Process: High Efficiency Shale Oil Recovery," poster at the 23<sup>rd</sup> Annual ACERC Conference, Provo, Utah (February 23-24, 2009).
84. Shurtz, R. and T. H. Fletcher, "Pressurized Coal Pyrolysis and CO<sub>2</sub> Gasification at High Initial Heating Rates," oral presentation and poster at the 24<sup>th</sup> Annual ACERC Conference, Provo, Utah (February 25-26, 2010).
86. Lewis, A. and T. H. Fletcher, "Predicting Sawdust Pyrolysis Yields Using the CPD Code with a Tar Cracking Model," oral presentation and poster at the 24<sup>th</sup> Annual ACERC Conference, Provo, Utah (February 25-26, 2010).
87. Pugmire, R. J., M. S. Solum, R. Shurtz, and T. H. Fletcher, "Structure Transformations of Coal to Char and Tar/Soot Formation during Gasification," oral presentation and poster at the 24<sup>th</sup> Annual ACERC Conference, Provo, Utah (February 25-26, 2010).

88. Dennis, M., W. Cole, and T. H. Fletcher, "Effects of Wind on Flame Characteristics of Leaves and Needles," oral presentation and poster at the 24<sup>th</sup> Annual ACERC Conference, Provo, Utah (February 25-26, 2010).
89. Cole, W., M. Dennis, and T. H. Fletcher, "Observations of Burning Bush Behavior as a Function of Wind and Moisture Content," oral presentation and poster at the 24<sup>th</sup> Annual ACERC Conference, Provo, Utah (February 25-26, 2010).
90. Andersen, B., W. Cole, M. Dennis, and T. H. Fletcher, "Modeling a Burning Bush with and without Wind using a Semi-Empirical Model," oral presentation and poster at the 24<sup>th</sup> Annual ACERC Conference, Provo, Utah (February 25-26, 2010).
91. Laycock, R., D. Rappleye, J. Gallacher, W. Ai, T. H. Fletcher, and J. P. Bons, "Deposition of Particulate from Coal-derived Syngas on Turbine Blades with Film Cooling," poster at the 24<sup>th</sup> Annual ACERC Conference, Provo, Utah (February 25-26, 2010).
92. Hillier, J., T. Bezzant, and T. H. Fletcher, "Structural Information of an Organic Sample from Pyrolysis Products," poster at the 24<sup>th</sup> Annual ACERC Conference, Provo, Utah (February 25-26, 2010).

### **Student M.S. Theses**

1. Flores, D. V., "The Use of Two Mixture Fractions to Treat Coal Combustion Products in Turbulent Pulverized-Coal Flames," M.S. Thesis, Chemical Engineering Department, Brigham Young University (April, 1996).
2. Watt, M., "The Chemical Structure of Coal Tar and Char During Devolatilization," M.S. Thesis, Chemical Engineering Department, Brigham Young University (August, 1996).
3. Mallampalli, H., "Evaluation of CH<sub>4</sub>/NO Global Mechanisms Used for Modeling Lean Premixed Turbulent Combustion of Natural Gas," M.S. Thesis, Chemical Engineering Department, Brigham Young University (August, 1996).
4. Brown, Alexander L., "Modeling Soot in Pulverized Coal Flames," M.S. Thesis, Mechanical Engineering Department, Brigham Young University (August, 1997).
5. Hambly, Eric M., "The Chemical Structure of Coal Char and Tar during Devolatilization," M.S. Thesis, Chemical Engineering Department, Brigham Young University (April, 1998).
6. Genetti, D. B., "An Advanced Model of Coal Devolatilization Based on Chemical Structure," M.S. Thesis, Chemical Engineering Department, Brigham Young University (April, 1999).
7. Smith, S. G., "Effects of Moisture on Combustion Characteristics of Live California Chaparral and Utah Foliage," M.S. Thesis, Chemical Engineering Department, Brigham Young University (August, 2005).
8. Sowa, J. M., "Studies of Coal Nitrogen Release Chemistry for Oxyfuel Combustion and Chemical Additives," M.S. Thesis, Chemical Engineering Department, Brigham Young University (December, 2009).
9. Lewis, A. D., "Sawdust Pyrolysis and Petroleum Coke CO<sub>2</sub> Gasification at High Heating Rates," M.S. Thesis, Chemical Engineering Department, Brigham Young University (April, 2011).
10. Shen, C., "Application of Fuel Element Combustion Properties to a Semi-Empirical Flame Propagation Model for Live Wildland Utah Shrubs," M.S. Thesis, Chemical Engineering Department, Brigham Young University (April, 2013).

### **Student Ph.D. Dissertations**



1. Ma, J., "Soot Formation During Coal Pyrolysis," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (August, 1996).
2. Perry, S. T., "A Global Free-Radical Mechanism for Nitrogen Release during Coal Devolatilization Based on Chemical Structure," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (December, 1999).
3. Hong, J., "Modeling Char Oxidation as a Function of Pressure Using an Intrinsic Langmuir Rate Equation," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (April, 2000).
4. Zhang, H., "Nitrogen Evolution and Soot Formation during Secondary Pyrolysis," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (April, 2001).
5. Clayton, D. J., "Modeling Flow Effects during Polymer Decomposition Using Percolation Lattice Statistics," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (December, 2002).
6. Flores, D. V., "Analysis of Lean Premixed Turbulent Combustion Using Coherent Anti-Stokes Raman Spectroscopy Temperature Measurements," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (April, 2003).
7. Zeng, D., "Effects of Pressure on Coal Pyrolysis at High Heating Rates and Char Combustion," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (December, 2005).
8. Price, R. J., "Modeling Three Reacting Flow Systems with Modern Computational Fluid Dynamics," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University, (August, 2007).
9. Clark, M. M., "Development and Evaluation of a Sub-Grid Combustion Model for a Landscape Scale 3-D Wildland Fire Simulator," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (August, 2008).
10. King, N. H., "Vapor-Liquid Equilibrium of Polymer Solutions during Thermal Decomposition of Rigid Foams," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (August, 2008).
11. Pickett, B. M., "Effects of Moisture on Combustion of Live Wildland Forest Fuels," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University, (August, 2008).
12. Ai, W., "Deposition of Particulate from Coal-derived Syngas on Gas Turbine Blades Near Film Cooling Holes," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (December, 2009).
13. Hillier, J. L., "Pyrolysis Kinetics and Chemical Structure Considerations of a Green River Oil Shale and its Derivatives," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (April, 2011).
14. Shurtz, R. C., "Effects of Pressure on the Properties of Coal Char under Gasification Conditions at High Heating Rates," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (December, 2011).
15. Prince, D. R., "Measurement and Modeling of Fire Behavior in Leaves and Sparse Shrubs," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (July, 2014).
16. Lewis, A. D., "Gasification of Biomass, Coal, and Petroleum Coke at High Heating Rates and Elevated Pressure," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (November, 2014).

17. Gallacher, J. R., "The Influence of Season, Heating Mode and Slope Angle on Wildland Fire Behavior," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (February, 2016).
18. Laycock, R. G., "Particle Deposition Behavior from Coal-Derived Syngas in Gas Turbines at Modern Turbine Inlet Temperatures," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (July, 2017).
19. Holland, T. M., "A Comprehensive Coal Conversion Model Extended to Oxy-coal Conditions," Ph.D. Dissertation, Chemical Engineering Department, Brigham Young University (July, 2017).

### **Presentations at Technical Meetings**

**(requiring associated paper unless stated; ACERC meetings listed separately)**

1. Fletcher, T. H., P. J. Smith, and L. D. Smoot, "Evaluation of a 2-D Coal Combustion Model," 1984 Spring Meeting of the Western States Section of the Combustion Institute, Boulder, Colorado (April, 1984).
2. Fletcher, T. H., P. J. Smith, L. L. Baxter, and L. D. Smoot, "Coal-Water Mixtures Modeling," First Annual Heat Engines Contractor's Meeting, U.S. DOE/METC, Morgantown, West Virginia (May, 1984).
3. Baxter, L. L., T. H. Fletcher, P. J. Smith, and L. D. Smoot, "Coal-Water Mixtures Combustion Model," 1984 Fall Meeting of the Western States Section of the Combustion Institute, Palo Alto, California (October, 1984).
4. Brown, B. W., K. B. Christensen, T. H. Fletcher, P. O. Hedman, P. J. Smith, and L. D. Smoot, "Modeling and Experimental Studies of An Entrained Flow Gasifier," presented at the AIChE 1984 Annual Meeting, San Francisco, California (November 25-30, 1984).
5. Holve, D. J., K. Gomi, and T. H. Fletcher, "Comparative Combustion Studies of Ultrafine Coal/Water Slurries and Pulverized Coal," presented at the Seventh International Symposium on Coal Slurry Fuels Preparation and Utilization, New Orleans, Louisiana (May 21-24, 1985).
6. Musarra, S. P., T. H. Fletcher, S. Niksa, and H. A. Dwyer, "Heat and Mass Transfer in the Vicinity of a Devolatilizing Coal Particle," presented at the 23rd ASME/AIChE National Heat Transfer Conference, Denver, Colorado (August, 1985).
7. Fletcher, T. H., "Sensitivity of Combustion Calculations to Devolatilization Rate Expressions," presented at the 1985 Fall Meeting of the American Flame Research Committee, Sandia National Laboratories, Livermore, California (October 17-18, 1985).
8. Holve, D. J., J. Hoonstra, and T. H. Fletcher, "The Influence of Size Distribution Characteristics in Heterogeneous Combustion," presented at the 1985 Fall Meeting of the American Flame Research Committee, Sandia National Laboratories, Livermore, California (October 17-18, 1985).
9. Smith, P. J. and T. H. Fletcher, "A Study of Two Chemical Reaction Models in Turbulent Coal Combustion," presented at the 1985 Fall Meeting of the Western States Section of the Combustion Institute, Davis, California (October 21-22, 1985).
10. Smith, P. J. and T. H. Fletcher, "A Study of Two Chemical Reaction Models in Turbulent Coal Combustion," presented at the ASME 107th Winter Annual Meeting (1986).
11. Niksa, S., A. R. Kerstein, and T. H. Fletcher, "Predicting Devolatilization at Typical Coal Combustion Conditions with the Distributed-Energy Chain Model," American Chemical

- Society Division of Fuel Chemistry Preprints, **31**:3, 237, Anaheim, California (September, 1986)
12. Niksa, S., A. R. Kerstein, and T. H. Fletcher, "Predicting Devolatilization at Typical Coal Combustion Conditions with the Distributed-Energy Chain Model," presented at the 2nd ASME/JSME Thermal Engineering Joint Conference, Honolulu, Hawaii (March, 1987).
  13. Baxter, L. L., D. K. Ottesen, and T. H. Fletcher, "Spectral Emission Characteristic of Coal Particles," presented at the 1987 Spring Meeting of the Western States Section of the Combustion Institute, Provo, Utah (April, 1987).
  14. Fletcher, T. H., Baxter, L. L., and Ottesen, D. K., "Spectral Emissivities of Size-Graded Coal Particles: Implications for Pyrometry," *1987 International Conference on Coal Science*, ed. Moulijn, J. A., Nater, K. A., and Chermin, H. A. G., Elsevier, New York, p. 945 (1987).
  15. Fletcher, T. H., L. L. Baxter, and D. K. Ottesen, "Spectral Emission Characteristics of Size-Graded Coal Particles," ACS Division of Fuel Chemistry preprints, **32**:3, 42-50, New Orleans, Louisiana (1987).
  16. Fletcher, T. H., "Kinetics of Rapid Coal Devolatilization," presented at the 1987 PETC/METC AR&TD Contractors' Review Meeting, Morgantown, West Virginia (October 14-16, 1987).
  17. Grant, D. M., R. J. Pugmire, T. H. Fletcher, and A. R. Kerstein, "A Chemical Model of Coal Devolatilization Using Percolation Lattice Statistics," presented at the 1988 Spring Meeting of the Western States Section of the Combustion Institute, Salt Lake City, Utah (March, 1988). Also in ACS Division of Fuel Chemistry preprints, **33**:2, 322 Toronto, Canada (June, 1988).
  18. Fletcher, T. H., "Time-Resolved Temperature Measurements of Individual Coal Particles During Devolatilization," presented at the 1988 Spring Meeting of the Western States Section of the Combustion Institute, Salt Lake City, Utah (March, 1988). Presented at the poster session of the 22nd Symposium (International) on Combustion, Seattle, Washington (August, 1988).
  19. Fletcher, T. H., "Kinetics of Rapid Coal Devolatilization," presented at the 1988 PETC/METC AR&TD Contractors' Review Meeting, Pittsburgh, Pennsylvania (September 6-9, 1988).
  20. Fletcher, T. H., "Time-Resolved Particle Temperature and Mass Loss Measurements of a Bituminous Coal During Devolatilization," presented at the 1988 Fall Meeting of the Western States Section of the Combustion Institute, Dana Point, California (October 17-18, 1988).
  21. Solum, M. S., R. J. Pugmire, D. M. Grant, T. H. Fletcher, and P. Solomon, "Solid State  $^{13}\text{C}$  NMR Studies of Coal Char Structure Evolution," presented at the 1989 Spring Meeting of the Western States Section of the Combustion Institute, Pullman, Washington (March 20-21, 1989).
  22. Fletcher, T. H., A. R. Kerstein, R. J. Pugmire, and D. M. Grant, "Prediction of the Effects of Heating Rate and Temperature on Pulverized Coal Devolatilization," presented at the First Symposium on Advances in Coal Spectroscopy, Snowbird, Utah (June 14-16, 1989).
  23. Fletcher, T. H., A. R. Kerstein, R. J. Pugmire, R. J., and D. M. Grant, "A Chemical Percolation Model for Devolatilization: II. Temperature and Heating Rate Effects," ACS Division of Fuel Chemistry preprints, **34**:4, 1272, Miami Beach, Florida (1989).

24. Solum, M. S., R. J. Pugmire, D. M. Grant, T. H. Fletcher, and P. R. Solomon, "Solid State  $^{13}\text{C}$  NMR Studies of Coal Char Structure Evolution," ACS Division of Fuel Chemistry preprints, **34**:4, 1337, Miami Beach, Florida (1989).
25. Fletcher, T. H., A. R. Kerstein, R. J. Pugmire, and D. M. Grant, "A Chemical Percolation Model for Devolatilization: II. Temperature and Heating Rate Effects," presented at the 1989 Fall Meeting of the Western States Section of the Combustion Institute, Livermore, California (October, 1989).
26. Fletcher, T. H., "Kinetics of Rapid Coal Devolatilization," presented at the 1989 PETC/METC AR&TD Contractors' Review Meeting, Morgantown, West Virginia (October 3-5, 1989).
27. Pugmire, R. J., T. H. Fletcher, D. M. Grant, and A. R. Kerstein, "A Chemical Model of Coal Devolatilization Using Percolation Lattice Statistics," *Proceedings of the 1989 International Conference on Coal Science*, Elsevier Press, London, England, vol. 1, p. 481 (October 23-27, 1989).
28. Mitchell, R. E. and T. H. Fletcher, "Particle-Sizing Pyrometry in Pulverized Coal-Seeded Flow Reactors," presented at the Annual Meeting of the American Institute of Chemical Engineers, San Francisco, CA (November, 1989). (no associated technical paper)
29. Lo, R., T. H. Fletcher, R. J. Pugmire, and H. Meuzelaar, "Curie-Point Desorption GC/MS and Low Voltage MS Studies of the Chemical Composition of Coal Tars During Rapid Devolatilization," presented at the 13th Annual Symposium of the Rocky Mountain Fuel Society, Salt Lake City, Utah (March, 1990).
30. Pugmire, R. J., T. H. Fletcher, M. S. Solum, S. Critchfield, and D. M. Grant, "Structural Evolution of Matched Tar/Char Pairs in Rapid Pyrolysis Experiments," presented at the poster session for the Twenty-Third Symposium (International) on Combustion, Orleans, France (July 22-27, 1990).
31. Lo, R., R. J. Pugmire, T. H. Fletcher, and H. L. C. Meuzelaar, "Mass Spectrometric Studies of the Chemical Composition of Coal Tars Produced in a Laminar Flow Reactor," ACS Division of Fuel Chemistry preprints, **35**:3, 697, Washington D. C. (1990).
32. Pugmire, R. J., M. S. Solum, D. M. Grant, S. Critchfield, and T. H. Fletcher, "Structural Evolution of Matched Tar/Char Pairs in Rapid Pyrolysis Experiments," presented at the International Conference on Coal Structure and Reactivity, Queens College, Cambridge, UK (September 5-7, 1990).
33. Baxter, L. L., R. E. Mitchell, and T. H. Fletcher, "Experimental Determination of Mineral Matter Release During Coal Devolatilization," proceedings of the Seventh Annual International Pittsburgh Coal Conference, Pittsburgh, Pennsylvania, p. 62 (1990).
34. Solomon, P. R., T. H. Fletcher, and R. J. Pugmire, "Progress in Coal Pyrolysis," proceedings of the Seventh Annual International Pittsburgh Coal Conference, Pittsburgh, Pennsylvania, p. 3 (1990).
35. Fletcher, T. H., "Rates and Mechanisms of Pulverized Coal Devolatilization at Rapid Heating Rates," presented at the DOE/PETC Advanced Research and Technology Development, Direct Utilization and Instrumentation and Diagnostics Contractors' Review Meeting, Pittsburgh, Pennsylvania (September 16-18, 1990).
36. Fletcher, T. H., D. M. Grant, and R. J. Pugmire, "Predicting Vapor Pressures of Tar and Metaplast During Coal Pyrolysis," ACS Division of Fuel Chemistry preprints, **36**:1, 250, Atlanta, Georgia (1991).

37. Pugmire, R. J., T. H. Fletcher, M. S. Solum, and D. M. Grant, "Correlations of Pyrolysis Yields with NMR Data," poster presented at the International Conference on Coal Science, Newcastle upon Tyne, England (September, 1991).
38. Fletcher, T. H., M. S. Solum, D. M. Grant, and R. J. Pugmire, "Chemical Structure of Char in the Transition from Devolatilization to Combustion," ACS Division of Fuel Chemistry preprints, **37**:2, 677, San Francisco, California (1992).
39. Pugmire, R. J., M. S. Solum, D. M. Grant, and T. H. Fletcher, "The Use of C-13 NMR Structural Information for Predicting Coal Devolatilization Behavior," presented at Coal Structure 92: 2nd International Symposium on Structure, Properties and Reactivity of Coal, Krakow, Poland (21-23 September, 1992).
40. Pugmire, R. J., M. S. Solum, T. H. Fletcher, and D. M. Grant, "Coal and Char Structural Parameters Derived from Solid State  $^{13}\text{C}$  NMR Studies," presented at the 5th Australian Coal Science Conference, University of Melbourne, Australia (December, 1992).
41. Gale, T. K., C. H. Bartholomew, and T. H. Fletcher, "Comparison of the Physical Structure of Chars Prepared Under Different Pyrolysis Conditions Such as: Temperature, Gas Atmospheres, and Heating Rates," presented at the Rocky Mountain Fuel Symposium, Salt Lake City, Utah (March 11-12, 1993).
42. Fletcher, T. H., S. Bai, R. J. Pugmire, M. S. Solum, S. Woods, and D. M. Grant, "Chemical Structural Features of Pyridine Extracts of the Argonne Premium Coals Using  $^{13}\text{C}$  NMR Spectroscopy," presented at the 1993 Spring Meeting of the Western States Section of the Combustion Institute, Salt Lake City, Utah (March 22-23, 1993).
43. Pugmire, R. J., M. S. Solum, S. Bai, T. H. Fletcher, S. Woods, and D. M. Grant, "The Use of Solid State C-13 NMR Spectroscopy to Study Pyridine Extracted and Extraction Residues in the Argonne Premium Coals," ACS Division of Fuel Chemistry preprints, **38**:2, 647-654, Denver, Colorado (March 28-April 2, 1993).
44. Fletcher, T. H., S. Bai, J. Ma, S. Woods, M. S. Solum, R. J. Pugmire, and D. M. Grant, " $^{13}\text{C}$  NMR Chemical Structural Features of Coal Extracts, Chars and Tars During Rapid Pyrolysis," poster presentation at Coal Utilization and the Environment, sponsored by *Fuel*, Orlando, Florida (May 17-20, 1993).
45. Cope, R. F., T. H. Fletcher, and W. C. Hecker, "Mineral Effects on the Reactivity of Beulah Zap Lignite Char," poster presentation at Coal Utilization and the Environment, sponsored by *Fuel*, Orlando, Florida (May 17-20, 1993).
46. Gale, T. K., C. H. Bartholomew, and T. H. Fletcher, "Comparison of Reactivity and Physical Structure of Chars Prepared Under Different Pyrolysis Conditions, i.e., Temperature, Gas Atmosphere, and Heating Rate," Proceedings of the 7th International Conference on Coal Science, Vol. 2, pp. 17-20, Banff, Alberta, Canada (September 12-17, 1993).
47. Fletcher, T. H., S. Bai, J. Ma, S. Woods, M. S. Solum, R. J. Pugmire, and D. M. Grant, "Chemical Structural Features of Coal Chars, Tars, and Char Extracts During Rapid Pyrolysis Using  $^{13}\text{C}$  and  $^1\text{H}$  NMR Spectroscopy," Proceedings of the 7th International Conference on Coal Science, Vol. 2, pp. 293-296, Banff, Alberta, Canada (September 12-17, 1993).
48. Ma, J., M. Dean, J. Rossman, T. Sastrawinata, B. Webb, T. H. Fletcher, "Properties of Soot from Coal Tar," presented at the 1993 Fall Meeting of the Western States Section of the Combustion Institute, SRI, Menlo Park, CA (October 18-19, 1993).

49. Fletcher, T. H. and R. J. Pugmire, "Chemical Structure Changes of Coal, Char, and Tar During Devolatilization," invited paper, ACS Division of Fuel Chemistry preprints, **39**:1, 108-112, San Diego, CA (March, 1994).
50. Fletcher, T. H. and R. J. Pugmire, "Chemical Structure Changes of Coal, Char, and Tar During Devolatilization," poster presentation at the Sci-Mix Session of the ACS Spring Meeting, San Diego, CA (March, 1994).
51. Fletcher, T. H., "Combustion Research at Brigham Young University," invited talk (no paper) at the DOE Combustion Modeling Information Exchange, Argonne National Laboratories (March 29-30, 1994).
52. Gale, T. K., C. H. Bartholomew, and T. H. Fletcher, "Decreases in the Swelling and Porosity of Bituminous Coals During Devolatilization at High Heating Rates," poster presented at the *Twenty-Fifth Symposium (International) on Combustion* (July 31-August 5, 1994).
53. Solomon, P. R. and T. H. Fletcher, "The Impact of Pyrolysis in Combustion," an invited topical review paper presented at the *Twenty-Fifth Symposium (International) on Combustion*, Irvine, California (July 31-August 5, 1994).
54. Fletcher, T. H., "Combustion Modeling in Advanced Gas Turbine Systems," Advanced Gas Turbine Systems Research Workshop II, Indianapolis, Indiana (March 26-29, 1995).
55. Flores, D. V. and T. H. Fletcher, "A Two Mixture Fraction Approach for Modeling Turbulent Combustion of Coal Volatiles and Char Oxidation Products," proceedings of the joint technical meeting of the Central and Western (USA) Sections and Mexican National Section of the International Combustion Institute and American Flame Research Committee, San Antonio, Texas (April 23-26, 1995).
56. Ma, J., T. H. Fletcher, B. W. Webb, "Effect of Flame Environment on Soot Formation in Coal Combustion," poster presented at the 8th International Conference on Coal Science, Oviedo, Spain (September 10-15, 1995); in *Coal Science*, edited by J. A. Pajares and J. M. D. Tascón, **1**, 869-872, Elsevier, New York (1995).
57. Watt, M., W. Allen, and T. H. Fletcher, "Changes in the Forms of Nitrogen and Oxygen during Rapid Coal Pyrolysis," poster presented at the 8th International Conference on Coal Science, Oviedo, Spain (September 10-15, 1995); in *Coal Science*, edited by J. A. Pajares and J. M. D. Tascón, **2**, 1685-1688, Elsevier, New York (1995).
58. Flores, D. V. and T. H. Fletcher, "A Two Mixture Fraction Approach for Modeling Turbulent Combustion of Coal Volatiles and Char Oxidation Products," presented at the 8th International Conference on Coal Science, Oviedo, Spain (September 10-15, 1995); in *Coal Science*, edited by J. A. Pajares and J. M. D. Tascón, **2**, 1767-1770, Elsevier, New York (1995).
59. Genetti, D. B., T. H. Fletcher, and R. J. Pugmire, "Predicting  $^{13}\text{C}$  NMR Measurements Based on Coal Elemental Composition," presented at the 8th International Conference on Coal Science, Oviedo, Spain (September 10-15, 1995); in *Coal Science*, edited by J. A. Pajares and J. M. D. Tascón, **1**, 331-334, Elsevier, New York (1995).
60. Rigby, J. R., B.W. Webb, and T. H. Fletcher, "Measurement of the Optical Properties of Coal-Derived and Propane-Derived Soot," presented at the Spring Meeting of the Western States Section of the Combustion Institute, Tempe, Arizona, March 11-12 (1996).
61. Fletcher, T. H., W. Watt, S. Bai, M. S. Solum, and R. J. Pugmire, "Chemical Structure of Coal Tar During Devolatilization," ACS Division of Fuel Chemistry preprints, **41**(2), 752-755, New Orleans, LA (March, 1996).

62. Watt, M., T. H. Fletcher, S. Bai, M. S. Solum, and R. J. Pugmire, "Chemical Structure of Coal Tar During Devolatilization," presented at the Twenty-Sixth Symposium (International) on Combustion, Naples, Italy (July, 1996).
63. Ma, J., T. H. Fletcher, and B. W. Webb, "Conversion of Coal Tar to Soot During Coal Pyrolysis in a Post-Flame Environment," presented at the Twenty-Sixth Symposium (International) on Combustion, Naples, Italy (July, 1996).
64. Mallampalli, H. P., T. H. Fletcher, and J. Y. Chen, "Evaluation of CH<sub>4</sub>/NO<sub>x</sub> Global Mechanisms Used for Modeling Lean Premixed Turbulent Combustion of Natural Gas," presented at the Fall Meeting of the Western States Section of the Combustion Institute, University of Southern California, Los Angeles, CA (October 28-29, 1996).
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157. Withers, D., M. Dennis, W. Cole, and T. H. Fletcher, "Effects of Wind on Flame Characteristics of Leaves and Needles," poster presented at the International Association of Wildland Fire 3rd Fire Behavior and Fuels Conference, Spokane, Washington (October 25-29, 2010).
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162. R. G. Laycock and T. H. Fletcher, "Time-dependent deposition characteristics of fine coal flyash in a laboratory gas turbine environment," GT2011-46563, presented at the ASME Turbo Expo, Vancouver, Canada (June 6-10, 2011).
163. J. Bons, A. Ali, T. H. Fletcher, "Deposition of Particulate from Coal-Derived Syngas on Turbine Blades with Film Cooling," presented at the 2011 University Turbine Systems Research Workshop, Ohio State University (October 25 – 27, 2011).
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165. T. H. Fletcher, "A Fundamental Investigation of Fire Initiation and Fire Behavior in Sparse Vegetation," poster presentation at the NSF 2012 CBET Grantee Conference, Baltimore, MD (June 6-8, 2012).
166. T. H. Fletcher, "Oil Shale 1: Chemical Structure and Pyrolysis," short course presentation to Statoil, Trondheim, Norway (October 8, 2012).
167. Shurtz, R. C. and T. H. Fletcher, "Coal Char-CO<sub>2</sub> Gasification Kinetics at High Temperature and Pressure," presented at the International Pittsburgh Coal Conference, Pittsburgh, PA (October 15 - 18, 2012).
168. Fletcher, M. E. and T. H. Fletcher, "Application of L Systems to Geometrical Construction of Chamise and Juniper Shrubs," presented at the 4<sup>th</sup> Fire Behavior and Fuels Conference, International Association of Wildland Fire, Raleigh, NC (Feb. 18-22, 2013).
169. Prince, D. R. and T. H. Fletcher, "Semi-empirical Fire Spread Simulator for Utah Juniper and Chamise Shrubs," poster presented at the 4<sup>th</sup> Fire Behavior and Fuels Conference, International Association of Wildland Fire, Raleigh, NC (Feb. 18-22, 2013).
170. Shen, C. and T. H. Fletcher, "Fuel Element Combustion Properties for Live Wildland Utah Shrubs," poster presented at the 4<sup>th</sup> Fire Behavior and Fuels Conference, International Association of Wildland Fire, Raleigh, NC (Feb. 18-22, 2013).
171. Fletcher, T. H., "The Role of Chemical Structure in Predictions of Coal Pyrolysis and Char Conversion," invited presentation at the Fourteenth International Conference on Numerical Combustion, San Antonio, TX (April 8-10, 2012).
172. Shen, C. and T. H. Fletcher, "Combustion Properties of Fuel Segments for Live Wildland Utah Shrubs," presented at the 8<sup>th</sup> US National Combustion Meeting, The Combustion Institute, Park City, Utah (May 19-22, 2013).
173. Lewis, A. D. and T. H. Fletcher, "Pyrolysis and CO<sub>2</sub> Gasification Rates of Biomass at High Heating-Rate Conditions," presented at the 8<sup>th</sup> US National Combustion Meeting, The Combustion Institute, Park City, Utah (May 19-22, 2013).
174. Lewis, A. D. and T. H. Fletcher, "Pyrolysis Kinetics and CO<sub>2</sub> Gasification Rates of Petroleum Coke at High Heating Rates and Elevated Pressure," presented at the 8<sup>th</sup> US National Combustion Meeting, The Combustion Institute, Park City, Utah (May 19-22, 2013).
175. Prince, D. R. and T. H. Fletcher, "Semi-empirical Fire Spread Simulator for Manzanita, Utah Juniper and Chamise Shrubs," presented at the 8<sup>th</sup> US National Combustion Meeting, The Combustion Institute, Park City, Utah (May 19-22, 2013).

176. Prince, D. R. and T. H. Fletcher, "A Combined Experimental and Theoretical Study of the Combustion of Live vs. Dead Leaves," presented at the 8<sup>th</sup> US National Combustion Meeting, The Combustion Institute, Park City, Utah (May 19-22, 2013).
177. Pugmire R. J., T. H. Fletcher, J. Hillier, M. Solum, C. Mayne, and A. Orendt, "Detailed Characterization and Pyrolysis of Shale, Kerogen, Kerogen Chars, Bitumen, and Light Gases from a Green River Oil Shale Core," presented at the 33<sup>rd</sup> Oil Shale Symposium, Golden, CO (Oct 14-16, 2013).
178. Fletcher, T. H., R. Gillis, J. Adams, T. Hall, C. L. Mayne, M. S. Solum, and R. J. Pugmire, "Characterization of Pyrolysis Products from a Utah Green River Oil Shale by <sup>13</sup>C NMR, GC/MS, and FTIR," presented at the 33<sup>rd</sup> Oil Shale Symposium, Golden, CO (Oct 14-16, 2013).
179. Lansinger, V., J. Gallacher, T. H. Fletcher, "Seasonal Effects on the Ignition Characteristics of Live Fuels in Wildfires," presented at the student poster session of the 2013 AIChE Annual Meeting, San Francisco, CA (November 3-8, 2013).
180. Gallacher, J. R., V. Lansinger, S. Hansen, D. Jack, D. R. Weise, and T. H. Fletcher, "Effects of Season and Heating Mode on Ignition and Burning Behavior of Three Species of Live Fuel Measured in a Flat-flame Burner System," presented at the 2014 Spring Technical Meeting of the Western States Section of the Combustion Institute, California Institute of Technology, Pasadena, CA (March 24-25, 2014).
181. Lewis, A. D., E. G. Fletcher, and T. H. Fletcher, "Entrained-Flow CO<sub>2</sub> Gasification of Sawdust, Switchgrass, and Corn Stover Chars in a Pressurized Flat-Flame Burner Reactor," presented at the 2014 Spring Technical Meeting of the Western States Section of the Combustion Institute, California Institute of Technology, Pasadena, CA (March 24-25, 2014).
182. Lewis, A. D., N. R. Marchant, D. J. Henley, E. G. Fletcher, and T. H. Fletcher, "Steam Gasification Kinetics of Three Bituminous Coal Chars at High Heating Rates and Elevated Pressure," presented at the 2014 Spring Technical Meeting of the Western States Section of the Combustion Institute, California Institute of Technology, Pasadena, CA (March 24-25, 2014).
183. Yang, H., S. Li, T. H. Fletcher, M. Dong, W. Zhou, "Simulation of the Evolution of Pressure in a Lignite Particle during Pyrolysis," presented at the 2014 Spring Technical Meeting of the Western States Section of the Combustion Institute, California Institute of Technology, Pasadena, CA (March 24-25, 2014).
184. Fletcher, T. H., A. D. Lewis, D. R. Prince, "Chemical Structure-Based Pyrolysis Models of Wood and Biomass for Possible Use in CFD Fire Simulations," presented at the 6<sup>th</sup> FM Global Open Source CFD Fire Modeling Workshop, Norwood, MA (May 15-16, 2014).
185. Gallacher, J. R., V. Lansinger, S. Hansen, T. Ellsworth, D. R. Weise, and T. H. Fletcher, "Effects of Season and Heating Mode on Ignition and Burning Behavior of 10 Live Fuel Species Measured in a Flat-flame Burner System," poster presented at the 35<sup>th</sup> International Symposium on Combustion, San Francisco, CA (August 3-8, 2014).
186. Fletcher, T. H., D. C. Barfuss, and R. J. Pugmire, "Modeling Oil Shale Pyrolysis using the Chemical Percolation Devolatilization Model," presented at the 34<sup>th</sup> Oil Shale Symposium, Golden, CO (October 13-15, 2014).
187. Laycock, R. and T. H. Fletcher, "Independent Effects of Surface and Gas Temperature on Coal Flyash Deposition in Gas Turbines at Temperatures Up to 1400°C," presented at the 21<sup>st</sup> International Conference on Impacts of Fuel Quality on Power Production, Snowbird, Utah (October 26-31, 2014).

188. Fletcher, T. H., J. Hillier, R. Gillis, J. Adams, D. Barfuss, C. L. Mayne, M. S. Solum, R. J. Pugmire, "Oil Shale: Structure and Reactions," invited seminar, BYU Chemistry Department (January 13, 2015).
189. Fletcher, T. H., J. Hillier, R. Gillis, J. Adams, D. Barfuss, C. L. Mayne, M. S. Solum, R. J. Pugmire, "Oil Shale: Structure and Reactions," invited seminar, College of Engineering, University of Alabama Huntsville (January 29, 2015).
190. Barfuss, D. and T. H. Fletcher, "Modeling Oil Shale Pyrolysis using the Chemical Percolation (CPD) Devolatilization Model," presented at the ninth annual Utah Conference on Undergraduate Research, Dixie State University, St. George, Utah (February 27<sup>th</sup>, 2015).
191. Holland, T. and T. H. Fletcher, "Coal Particle Combustion," poster presented at the Stewardship Science Academic Programs (SSAP) Symposium, Santa Fe, New Mexico (March 11-12, 2015).
192. Richards, A. and T. H. Fletcher, "A Modified Two-step Model of Devolatilization," presented at the 15<sup>th</sup> International Conference on Numerical Combustion, Avignon, France (April 19-22, 2015).
193. Lignell, D., A. Josephson, B. Isaac, and T. H. Fletcher, "Large eddy simulation of soot formation in an oxy-coal combustor," presented at the 15<sup>th</sup> International Conference on Numerical Combustion, Avignon, France (April 19-22, 2015).
194. Gallacher, J. R., V. Lansinger, S. Hansen, D. R. Weise, and T. H. Fletcher, "Effects of Season and Heating Mode on Ignition and Burning Behavior of Ten Species of Live Fuel Measured in a Flat-flame Burner System," presented at the 9<sup>th</sup> U.S. National Combustion Meeting, Cincinnati, OH (May 17-20, 2015).
195. Yashwanth, B. L., J. R. Gallacher, B. Shotorban, S. Mahalingam, T. H. Fletcher, and D. R. Weise, "Experimental and numerical investigation of the effect of heating modes and moisture content on pyrolysis and ignition of live fuels," presented at the 9<sup>th</sup> U.S. National Combustion Meeting, Cincinnati, OH (May 17-20, 2015).
196. Chen, S., D. O. Lignell, and T. H. Fletcher, "Flame Merging Experiments in Low Speed, Non-Premixed Natural Gas Flames," presented at the 9<sup>th</sup> U.S. National Combustion Meeting, Cincinnati, OH (May 17-20, 2015).
197. Chen, S., J. R. Gallacher, T. H. Fletcher, and D. R. Weise, "Experiments and Modeling of Fire Spread in Big Sagebrush and Chamise Shrubs in a Wind Tunnel," presented at the 9<sup>th</sup> U.S. National Combustion Meeting, Cincinnati, OH (May 17-20, 2015).
198. Josephson, A. J., B. Isaac, D. O. Lignell, and T. H. Fletcher, "Large eddy simulation of an oxy-coal combustor," presented at the 9<sup>th</sup> U.S. National Combustion Meeting, Cincinnati, OH (May 17-20, 2015).
199. Laycock, R. and T. H. Fletcher, "Independent effects of surface and gas temperature on coal flyash deposition in gas turbines at temperatures up to 1400°C," paper GT2015-43575, presented at the ASME Turbo Expo, Montreal, Canada (June 15-19, 2015).
200. Fletcher, T. H., "High Temperature, High Pressure Gasification of Coal Chars Prepared at High Heating Rates," presented at the Storch Symposium, 250<sup>th</sup> American Chemical Society National Meeting, Boston, Massachusetts (August 16-20, 2015).
201. Shen, C., M. E. Fletcher, J. R. Gallacher, D. R. Prince, and T. H. Fletcher, "Experiments and Modeling of Fire Spread in Big Sagebrush and Chamise Shrubs in a Wind Tunnel," presented at the Western States Section of the Combustion Institute, Brigham Young University, Provo, UT (October 5-6, 2015).



202. Shen, C., D. O. Lignell, and T. H. Fletcher, "Flame Merging Experiments in Low Speed, Non-Premixed Natural Gas Flames," presented at the Western States Section of the Combustion Institute, Brigham Young University, Provo, UT (October 5-6, 2015).
203. Gallacher, J. R., V. Lansinger, S. Smith, A. Doll, D. R. Weise and T. H. Fletcher, "The Ignition and Burning of Live Fuels Studied Using Natural Variation in Fuel Characteristics," submitted for presentation at the Western States Section of the Combustion Institute, Brigham Young University, Provo, UT (October 5-6, 2015).
204. Gallacher, J. R., V. Lansinger, S. Hansen, S. Smith, D. R. Weise and T. H. Fletcher, "The Effect of Heating Mode on the Ignition and Burning Behavior of 10 Live Shrub Fuels," presented at the Western States Section of the Combustion Institute, Brigham Young University, Provo, UT (October 5-6, 2015).
205. Holland, T. and T. H. Fletcher, "Comprehensive Char Conversion Global Sensitivity Analysis," presented at the Western States Section of the Combustion Institute, Brigham Young University, Provo, UT (October 5-6, 2015).
206. Richards, A. and T. H. Fletcher, "A Comparison of Global Kinetic Models for Coal Devolatilization," presented at the Western States Section of the Combustion Institute, Brigham Young University, Provo, UT (October 5-6, 2015).
207. Kimball, D. C., B. W. Butler, and T. H. Fletcher, "Attachment of Flames on Slopes," presented at the Western States Section of the Combustion Institute, Brigham Young University, Provo, UT (October 5-6, 2015).
208. Fletcher, T. H. and R. J. Pugmire, "Using  $^{13}\text{C}$  NMR Chemical Structure Data to Model Oil Shale Pyrolysis for Green River and Estonian Oil Shale," presented at the 35<sup>th</sup> Oil Shale Symposium, Salt Lake City, Utah (October 5-6, 2015).
209. Fletcher, T. H., B. Adams, and C. Adams, "The CHESS Process: Environment Friendly, Low Cost Shale Oil Recovery," presented at the 35<sup>th</sup> Oil Shale Symposium, Salt Lake City, Utah (October 5-6, 2015).
210. Fletcher, T. H., "How Did a Trombone Player End Up Doing Research on Coal Combustion?" Izatt-Christensen Excellence in Research Award Presentation, Brigham Young University, Provo, UT (October 29, 2015).
211. Smith, S. A., J. R. Gallacher, and T. H. Fletcher, "Effects of Season and Heating Mode on Ignition and Burning Behavior of Ten Species of Live Fuel Measured in a Flat-flame Burner System," presented at the undergraduate research session of the Annual AIChE Meeting, Salt Lake City, UT (November 9, 2015).
212. Shen, C., M. E. Fletcher, J. R. Gallacher, D. R. Prince, and T. H. Fletcher, "Experiments and Modeling of Fire Spread in Big Sagebrush and Chamise Shrubs in a Wind Tunnel," presented at the 6<sup>th</sup> International Fire Ecology and Management Congress, San Antonio, Texas (November 16-20, 2015).
213. Gallacher, J. R., V. Lansinger, S. Smith, A. Doll, D. R. Weise and T. H. Fletcher, "The Ignition and Burning of Live Fuels Studied Using Natural Variation in Fuel Characteristics," presented at the 6<sup>th</sup> International Fire Ecology and Management Congress, San Antonio, Texas (November 16-20, 2015).
214. Gallacher, J. R., V. Lansinger, S. Hansen, S. Smith, D. R. Weise and T. H. Fletcher, "The Effect of Heating Mode on the Ignition and Burning Behavior of 10 Live Shrub Fuels," presented at the 6<sup>th</sup> International Fire Ecology and Management Congress, San Antonio, Texas (November 16-20, 2015).

215. Holland, T., S. Bhat, P. Marcy, J. Gattiker, J. D. Kress, and T. H. Fletcher, "Calibration and Extension of a Coal Char Annealing Model," presented at the Western States Section of the Combustion Institute, University of Washington, Seattle, WA (March 21-22, 2016).
216. Richards, A. P. and T. H. Fletcher, "Elemental Analysis of Coal Combustion: Coal, Char, and Volatiles," presented at the Western States Section of the Combustion Institute, University of Washington, Seattle, WA (March 21-22, 2016).
217. Gallacher, J. R., B. Ripa, B. Butler, and T. H. Fletcher, "The Influence of the Coanda Effect on Flame Attachment to Slopes and Firefighter Safety Zone Considerations," presented at the Western States Section of the Combustion Institute, University of Washington, Seattle, WA (March 21-22, 2016).
218. Ripa, B., J. R. Gallacher, D. Kimball, B. Clark, B. Butler, and T. H. Fletcher, "Modeling the Coanda Effect for Fires on Slopes Using FDS, with Implications for Wildland Firefighter Safety," presented at the Western States Section of the Combustion Institute, University of Washington, Seattle, WA (March 21-22, 2016).
219. Holland, T., S. Bhat, P. Marcy, J. Gattiker, J. D. Kress, and T. H. Fletcher, "Bayesian Uncertainty Quantification and Calibration of a Clean Coal Design Code," presented at CO2 Summit II: Technologies and Opportunities, Santa Ana Pueblo, NM (April 10-14, 2016).
220. Holland, T., S. Bhat, J. D. Kress, and T. H. Fletcher, "Extension and Calibration of Coal Combustion Models," poster presented at the Los Alamos National Laboratory Student Symposium, Los Alamos, NM (Aug. 3, 2016).
221. Safdari, S., H. R. Kariminia, and T. H. Fletcher, "Natural Attenuation and Biostimulation of Petroleum-Hydrocarbon Contaminated Soil in a Simulated Column," presented at the 2016 AIChE Meeting, San Francisco, CA (November 13-17, 2016).
222. Holland, T. and T. H. Fletcher, "A Comprehensive Model of Single Particle Pulverized Coal Combustion Extended to Oxy-coal Conditions," presented at the 10<sup>th</sup> National Combustion Institute Meeting, University of Maryland (April 23-26, 2017).
223. Shen, C., D. Prince, J. Gallacher, M. E. Fletcher, and T. H. Fletcher, "Semi-empirical Model for Fire Spread in Chamise and Big Sagebrush Shrubs with Spatially-Defined Fuel Elements and Flames," presented at the 10<sup>th</sup> National Combustion Institute Meeting, University of Maryland (April 23-26, 2017).
224. Josephson, A. J., T. H. Fletcher, and D. O. Lignell, "Modeling Soot in Coal Systems," presented at the 10<sup>th</sup> National Combustion Institute Meeting, University of Maryland (April 23-26, 2017).
225. Rahmati, M., M-S. Safdari, E. Amini, T. H. Fletcher, "Investigation of Merging Flames in Horizontal and Vertical Geometries," presented at the 10<sup>th</sup> National Combustion Institute Meeting, University of Maryland (April 23-26, 2017).
226. Richards, A., T. Shutt, T. H. Fletcher, "A Comprehensive Model for Predicting Elemental Composition of Coal Pyrolysis Products," presented at the 10<sup>th</sup> National Combustion Institute Meeting, University of Maryland (April 23-26, 2017).
227. Safdari, M.-S., M. Rahmati, E. Amini, and T. H. Fletcher, "Analysis of Pyrolysis Products from Live Shrub Fuels," presented at the 10<sup>th</sup> National Combustion Institute Meeting, University of Maryland (April 23-26, 2017).
228. Weise, D., T. H. Fletcher, B. Shotorban, B. Butler, M. Princevac, T. J. Johnson, M. Dietenberger, W. Mell, R. Ottmar, A. Hudak, S. McAllister, W. M. Hao, J. O'Brien, S. Mahalingham, and J. Reardon, "Measuring and Modeling Pyrolysis to Improve Prediction

- of Prescribed Fire Behavior,” poster presented at the 10<sup>th</sup> National Combustion Institute Meeting, University of Maryland (April 23-26, 2017).
229. Laycock, R. G. and T. H. Fletcher, “Formation of Deposits from Heavy Fuel Oil Ash in an Accelerated Deposition Facility at Temperatures up to 1206°C,” paper GT2017-63724, presented at the ASME Turbo Expo, Charlotte, North Carolina (June 26-30, 2017).
  230. Fletcher, T. H. and R. G. Laycock, “Particle Deposition Behavior of Ash from Various Fuels in Gas Turbine Environments at Temperatures up to 1400°C,” Invited presentation at the Workshop on Ash-related Issues in Gas Turbines, Center for Advanced Studies, Ludwig Maximilians University, Munich, Germany (July 3-5, 2017).
  231. Weise, D. R., T. H. Fletcher, S. Mahalingham, Z. Zhou, and L. Sun, “Fire Spread in Chaparral: Comparison of Data with Flame-Mass Loss Relationships,” presented at the Eighth International Symposium on Scale Modeling (ISSM-8), Portland, Oregon (Sept 12-14, 2017).
  232. Holland, T. and T. H. Fletcher, “Modeling Effects of Annealing on Coal Char Reactivity to O<sub>2</sub> and CO<sub>2</sub> Based on Preparation Conditions,” presented at the Western States Section of the Combustion Institute, University of Wyoming, Laramie, WY (October 2-3, 2017).
  233. Billings, B., M. Roberts, B. Butler, and T. H. Fletcher, Modeling the Coanda Effect with FDS and STARCCM+ to Predict the Effect of Fires on Slopes for Implications of Wildland Firefighter Safety,” presented at the Western States Section of the Combustion Institute, University of Wyoming, Laramie, WY (October 2-3, 2017).
  234. Rahmati, M., C. Harper, M. Butler, M.-S. Safdari, E. Amini, T. H. Fletcher, “Investigation of Merging Flames in Horizontal and Vertical Geometries,” presented at the Western States Section of the Combustion Institute, University of Wyoming, Laramie, WY (October 2-3, 2017).
  235. Amini, E., M.-S. Safdari, M. Rahmati, J. Howarth, J. DeYoung, and T. H. Fletcher, “Pyrolysis of Live Vegetation at Slow Heating Rates,” presented at the Western States Section of the Combustion Institute, University of Wyoming, Laramie, WY (October 2-3, 2017).
  236. Safdari, M.-S., J. Howarth, M. Rahmati, and T. H. Fletcher, “Study of Pyrolysis Products of Live and Dead Shrub Fuels from the Forest in the Southeastern United States,” to be presented at the 2017 AIChE Annual Meeting, Minneapolis, MN (October 29-November 3, 2017).
  237. Scharko, N. K., M.-S. Safdari, T. O. Danby, J. Howarth, T. N. Beiswenger, D. R. Weise, T. L. Myers, T. H. Fletcher, and T. J. Johnson, “Laboratory Measurements of Gas Phase Pyrolysis Products from Southern Wildland Fuels using Infrared Spectroscopy,” presented at the American Geophysical Union Conference, New Orleans (December 11-15, 2017).
  238. Fletcher, T. H. and T. Holland, “Improvements to a Detailed Fundamental Char Conversion Model for Oxy-Coal Combustion,” invited presentation, 2<sup>nd</sup> International Workshop on Oxy-Fuel Combustion, Bochum, Germany (February 14-15, 2018).
  239. Harper, C., M. Butler, M. Rahmati, and T. H. Fletcher, “Investigation of Merging Flames in Horizontal and Vertical Geometries,” submitted for presentation at the AIChE Regional Conference, Brigham Young University, Provo, UT (March 23-24, 2018).
  240. Amini, E., J. Howarth, J. DeYoung, and T. H. Fletcher, “Tar and Gas Composition from Slow Pyrolysis of 15 Live and Dead Plant Species from the Southeastern United States,” to be presented at the Fire Continuum Conference, Missoula, MT (May 21-24, 2018).

241. Safdari, M-S., J. P. Berryhill, and T. H. Fletcher, “Fast Pyrolysis of 15 Live and Dead Plant Species at Heating Rates Typical of Wildland Fires,” to be presented at the Fire Continuum Conference, Missoula, MT (May 21-24, 2018).
242. Rahmati, M., C. Harper, M. Butler, M-S. Safdari, E. Amini, and T. H. Fletcher, “Investigation of Flame Merging in Horizontal and Vertical Geometries, “ to be presented at the 10th FM Global Open Source CFD Fire Modeling Workshop, “ Norwood, MA (May 30-21, 2018).
243. Weise, D. R., T. H. Fletcher, T. J. Johnson, W. Hao, M. Dietenberger, M Princevac, B. Butler, S. McAllister, J. O'Brien, L. Loudermilk, R. Ottmar, A. Hudak, A. Kato, B. Shotorban, S. Mahalingam, W. E. Mell, “A Project to Measure and Model Pyrolysis to Improve Prediction of Prescribed Fire Behavior,” submitted for presentation at the 8th International Conference on Forest Fire Research, Coimbra, Portugal (November 10-16, 2018).