

Melvyn C. Branch, Professor Emeritus

1. General

Department of Mechanical Engineering (business)
University of Colorado
Boulder, CO 80309-0427

2899 S. Lakeridge Trail (home)
Boulder, CO 80302 (303) 442-8538

2. Education, Professional Training

B.S.E., Aerospace-Mechanical Sciences, Princeton University, Princeton, New Jersey, 1966.
M.S., Mechanical Engineering, University of California, Berkeley, California, 1968.
Ph.D., Mechanical Engineering, University of California, Berkeley, California, 1971.

3. Professional Experience

Teaching Fellow, International College, Beirut, Lebanon, 1966-1967.
Research Assistant, Teaching Fellow, University of California, Berkeley, California,
1968-1971.
National Science Foundation Postdoctoral Fellow, Imperial College, London, England,
1971-1972.
Assistant Professor of Mechanical Engineering, University of California, Berkeley,
California, 1973-1976.
Assistant Professor of Mechanical Engineering, University of Colorado, Boulder, Colorado,
1976-1979.
Associate Professor of Mechanical Engineering, University of Colorado, Boulder, Colorado,
1979-1985.
Acting Associate Dean of the Graduate School, University of Colorado, Boulder, Colorado,
1981-1982.
Professor of Mechanical Engineering, University of Colorado, Boulder, Colorado,
1985-present.
Associate Dean of the Graduate School, University of Colorado, Boulder, Colorado,
1987-1988.
Associate Dean of Engineering (Research and Administration), University of Colorado,
Boulder, 1995-2002.
Joseph Negler Professor of Engineering, University of Colorado, 2001-2006

5. Professional Activities

Consultant, Federal Trade Commission, San Francisco, California, 1974.
Consultant, Sandia Laboratories, Livermore, California, 1974-82.
Consultant, Aerotherm-Acurex Corporation, Mountain View, California, 1975.
Consultant, Attorney General's Office, Denver, Colorado, 1979.
Member, Colorado Air Quality Control Commission, 1979-1993; Secretary, 1980 - 1987,
Vice Chair, 1987-88, Chair, 1988-89.
Consultant, the RMH Group, Inc., Denver, Colorado, 1981-1982.
Consultant, TDA Corporation, Denver, Colorado, 1988-91.
Consultant, 3M Company, 1993-present.

5. Professional Service

Combustion Institute - Western States Section:

Preprints Chairman, 1973-1977

Vice Chairman, 1977-1979

Chairman, 1979-1981

Conference Chairman, 1978 Spring Meeting

Conference Chairman, 1984 Spring Meeting

State of Colorado:

Governor's Air Pollution Research Task Force, 1979-1981

Combustion Institute:

Board of Directors, 2000-2008.

Program Committee, International Combustion Symposium, 1978-2004.

Local Arrangements Chair, 27th International Combustion Symposium, Boulder, 2-7
August, 1998

National Research Council:

Graduate Fellowship Panel, 1981, 1982, 1984

Minority Graduate Fellowship Panel, 1981; Chairman, 1982, 1985

Advisory Committee for the Ford Foundation Doctoral Fellowship Program, 1990-91

Research Associateship Panel, 1990-91

Council for International Exchange of Scholars:

Discipline Screening Committee for Fulbright Fellowship Awards in Engineering, 1985-1988

Health Effects Institute, Research Committee Member, 2000-2008

Army Science Board, Consultant Member, 2000-2003.

Reviewer of Proposals and Papers for:

National Science Foundation
Department of Energy
Australian Research Council
Combustion and Flame
Combustion Science and Technology
Journal of Energy Resources Technology
International Combustion Symposium
Journal of Solar Energy Engineering
Heat Transfer and Fluid Mechanics Institute
Progress in Energy and Combustion Science

6. Society Membership

American Society of Mechanical Engineers, Member, 1969, Fellow, 1989
American Institute of Aeronautics and Astronautics, 1994
American Society for Engineering Education, 1995
Sigma Xi, Member, 1969
Combustion Institute, Member, 1970
Pi Tau Sigma, Member, 1976
Tau Beta Pi, Member, 1980
National Society of Black Engineers, Member, 1986

7. Research Grants

Principal Investigator, AFOSR-73-2560, "Nonequilibrium Effects in Nozzle and Exhaust Flow," 1973-1976, \$62,000.

Principal Investigator, NASA-NSC-3028, "Study of Techniques for Stabilization of Lean Combustion Systems," 1974-1976, \$151,000.

Co-Principal Investigator, NSF-GI-444379, "Automotive Engine Combustion with Excess Air," 1974-1976, \$420,000.

Co-Principal Investigator, EPRI-RP-233-1, "Hydrocarbon Flame Studies of the Formation of Nitric Oxide from Fuel Nitrogen," 1974-1976, \$154,000.

Principal Investigator, AFOSR-77-3103, "Nonequilibrium Properties of Exhaust Plumes," 1976-1981, \$159,767.

Principal Investigator, NOAA-NA81RAC10016, "Combustion of Bulk Metals," 1979-1982, \$31,660.

Principal Investigator, AFOSR-82-0065, "Flow of Gas-Particle Mixtures," 1981-1983, \$80,812.

Principal Investigator, NSF-CPE-8105300, "Nitric Oxide Reduction by Ammonia Addition to Post Flame Gases," 1982-1984, \$52,669.

Principal Investigator, AFOSR-84-0006, "Chemical Kinetics of Nitramine Propellant Combustion, 1983-1988, \$315,400.

Principal Investigator, AFOSR-84-0193, "Combustion Spectroscopy by Excimer Pumped Dye Laser Absorption and Fluorescence," 1984-1985, \$81,495.

Co-Investigator, AFOSR-85-0090, "Computational Support for Research Projects Supported by DOD," 1985-1986, \$140,335.

Co-Investigator, IBM Grant, "Laboratory and Computing Equipment for Education and Research," 1985-1986, \$265,000.

Principal Investigator, NSF-INT-86-04371, "Analysis of the Structure of Fuel/NO₂ Flames," 1986-1989, \$4,245.

Co-Investigator, NASA-NAGW-951, "Center for Low Gravity Fluid Mechanics and Transport Phenomena," 1986-1989, \$1,200,000.

Principal Investigator, AFOSR-88-0331, "Gas Phase Flame Chemistry of Energetic Material Combustion, 1988-1989, \$90,576.

Principal Investigator, AFOSR-90-0121, "Fundamental Studies of Chemical and Electrical Interactions in Rocket Engines," 1989-92, \$600,000.

Principal Investigator, NSF-INT-89-06231, "Analysis of the Structure of Fuel/NO_x Flames," 1989-92, \$6,400.

Principal Investigator, NASA-NAG3-1257, "Ignition and Combustion of Bulk Metals in a Microgravity Environment," 1991-94, \$280,000.

Principal Investigator, DOD F49620-93-1-0430, "Nonsteady Combustion Mechanisms of Advanced Solid Propellants," 1993-1997, \$1,712,000.

Principal Investigator, NASA-NAG3-1685, "Combustion Mechanisms of Bulk Metals at Low, Normal and Elevated Gravity," 1994-98, \$456,000.

Co-Investigator, ONR N00014-97-1-0434, "Imaging System for Propulsion Phenomena," 1996-97, \$201,000.

Principal Investigator, AFOSR-F49620-98-1-0069, "Structure and Stability of Partially Premixed Flames of Advanced Solid Propellants," 1998, \$26,000.

Principal Investigator, NASA-NAG3-2220, "Combustion of Metals in Reduced Gravity and Extra-terrestrial Environments," 1998-2002, \$457,346.

Principal Investigator, 3M Company, "Characterization of Burner Configurations for Improved Flame Treatment of Material Surfaces," 2000-2004, \$120,000.

Co-Investigator, Department of Energy, "Chemical Kinetics of Hydrogen-Rich Syngas Mixtures at Elevated Pressure," 2007-2010, \$270,000

8. Honors and Awards

Captain, Princeton University Track Team, 1965-1966, recipient of Bonthron Trophy, 1966

National Science Foundation Postdoctoral Fellowship, 1972

Society of Automotive Engineers Ralph. R. Teetor Award, 1974

Tau Beta Pi National Engineering Honor Society, 1980

University of Colorado Teacher Recognition Award, 1981

American Society of Mechanical Engineers Gustus L. Larson Award, 1982

Fulbright Fellowship, 1982

University of Colorado Faculty Fellowship, 1983

U.S. Environmental Protection Agency Outstanding Achievement Award, 1988

Denver Clean Air Task Force Certificate of Merit, 1988

Elected Fellow of American Society of Mechanical Engineers, 1989

Associated Western Universities Faculty Fellowship, 1990

University of Colorado Boulder Faculty Assembly Service Award, 1992

Joseph Negler Endowed Chair in Engineering, 2001-2006

9. Student Supervision

Samir Banna, "Ammonia-Nitric Oxide Reaction in the Post Flame Region of a Flat Flame Burner," PhD Thesis, University of California, Berkeley, December, 1979. (Currently Vice President for Research, Midmac Corporation, Riyadh, Saudi Arabia.)

Koichi Hayashi, "Measurement and Calculation of Properties of Gas-Solid Two-Phase Jets," PhD Thesis, University of Colorado, Boulder, December 1980. (Currently a Professor in the Aeronautical Engineering Department, Nagoya University, Nagoya, Japan.)

Habib I. Abualhamayel, "Structure of Laminar Premixed Flames of Methane, Methanol and their Blends in Oxygen," PhD Thesis, University of Colorado, Boulder, May, 1981. (Currently a Professor and Department Chair in the Mechanical Engineering Department, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia.)

John P. Seidle, "Spectroscopic Investigation of the Ammonia-Nitric Oxide Reaction in Post Flame Gases," PhD Thesis, University of Colorado, Boulder, August, 1981. (Currently a Research Engineer at AMOCO Corporation, Tulsa, Oklahoma.)

Ke Nguyen, "Ignition Characteristics of Bulk 6061 Aluminum Alloy, 302 Stainless Steel and 1018 Carbon Steel in a Pure Oxygen Environment," PhD Thesis, University of Colorado, Boulder, August, 1984. (Currently a Professor in the Mechanical Engineering Department, University of Tennessee, Knoxville, Tennessee.)

Abdulghani Al-Farayedhi, "Laser Induced Fluorescence Measurements of CH, CN, NH, NH₂ and OH in CH₄/NO₂/O₂ and CH₂O/NO₂/O₂ Flames," PhD Thesis, University of Colorado, Boulder, August 1987. (Currently a Professor in the Mechanical Engineering Department, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia.)

Mohammed Sadeqi, "Structure of the Multiple Luminous Zones of Flames of CH₄ and CH₂O with NO₂ and O₂," PhD Thesis, University of Colorado, Boulder, August 1987. (Currently a Research Engineer at the Kuwait Institute of Scientific Research.)

Faud Alasfour, "Structure and Kinetics of Flames of Methane and Formaldehyde with Nitrous Oxide," PhD Thesis, University of Colorado, Boulder, May 1989. (Currently a Professor in the Mechanical Engineering Department at Kuwait University, Kuwait City, Kuwait.)

Mohammed Habeebullah, "Laser Induced Fluorescence Measurements of Radical Species in Flames of Methane-Nitrous Oxide and Formaldehyde-Nitrous Oxide," PhD Thesis, University of Colorado, Boulder, May 1989. (Currently a Professor in the Mechanical Engineering Department at King Abdul Aziz University, Jeddah, Saudi Arabia.)

Hai Ming Tsai, "Structure and Kinetics of Laminar Flames of CO/N₂O and CH₄/N₂O," PhD Thesis, University of Colorado, Boulder, December 1992. (Currently a Professor at the Chinese Air Force Academy, Taiwan.)

Joseph J. Cor, "The Structure of Methane-Oxygen, Methane-Nitrous Oxide, and Carbon Monoxide-Nitrous Oxide Diffusion Flames at Low Pressure," PhD Thesis, University of Colorado, Boulder, December 1995.

Angel Abbud-Madrid, "The Influence of gravity on the Ignition and Combustion of Bulk Titanium and Magnesium," PhD Thesis, University of Colorado, Boulder, December 1996.

Neal P. Sullivan, "Transport Issues When Impinging Flame Jets on a Rotating Cylinder," PhD Thesis, University of Colorado, Boulder, September 1999.

Christopher B. Dreyer, "Laser Induced Fluorescence Imaging of Magnesium Oxide During the Combustion of Magnesium in Oxidizing Atmospheres," PhD Thesis, University of Colorado, Boulder, August 2000.

Abhijit Modak, "Detailed Numerical Simulation of Isolated Droplet/Particle Combustion with Applications to Combustion of Metals," Ph.D Thesis, University of Colorado, Boulder, May 2003.

Colleen Stroud, "Structure of Highly Impinging Flames on a Rotating Cylinder," Ph.D. Thesis, University of Colorado, Boulder, July 2005.

Additional service as MS thesis advisor and on MS and PhD thesis committees for over thirty students.

10. University Service

University of California, Berkeley:

Energy and Resources Committee, 1973-1976
Faculty Advisor, American Society of Mechanical Engineers Student Section, 1973-1976
Faculty Advisor, Black Engineering and Science Students Association, 1973-1976
Advisory Board, Mathematics, Engineering, Science Achievement Program, 1973-1976
Environmental Engineering Committee, 1975-1976, Chair, 1976
Chancellor's Advisory Committee on Student Affirmative Action, 1975-1976

University of Colorado, Boulder:

Mechanical Engineering Undergraduate Committee, 1976-1978
Mechanical Engineering Faculty Search Committee, 1976-1981, 1983-1985
College of Engineering Fluid Mechanics Committee, 1976-1981, Chair, 1976-1978
Chancellor Search Committee, 1977, 1985
Boulder Faculty Assembly, 1977-1979; 2000-2004
BFA Committee on Academic Planning Practices and Standards, 1977-1981, Chair, 1978-1979
University of Colorado Faculty Council, 1978-1979
Mechanical Engineering Graduate Committee, 1977-1981, 1982-1987, Chair, 1984-1986
Faculty Advisor, American Society of Mechanical Engineers and Student Section, 1978-1979
Program Review Panel, 1979- 1983
Glen Murphy Chair Committee, 1979-1985
Vice-Chancellor's Advisory Committee on Reappointment, Promotion and Tenure, 1980-84, 1990-92.
Executive Committee of the University-wide Graduate School, 1983-1987
Athletic Director Search Committee, 1984
Engineering Associate Dean Search Committee, 1986
Salary Equity Review Committee, 1986, 1990-91
Engineering Research Award Committee, Chair, 1986
Engineering Review Committee on Faculty Reappointment, 1985, Chair, 1986
Engineering Faculty Preceptor, 1985-1988

College Ad-Hoc Review Committee on Promotion and Tenure, 1985-88, Chair 1986-88
Mechanical Engineering Facilities Committee, Chair, 1986-1987
Faculty Advisor, National Society of Black Engineers, 1986-1988
University Council on Research and Creative Work, 1987-88
University Human Research Committee, 1987-88
University Animal Care and Animal Use Committee, 1987-88
Faculty Advisory Committee on Academic Issues in the Development of the East Campus
Research Park, Vice Chair, 1987-88.
University Institute-Department Relations Committee, Chair, 1987-88
Executive Advisory Council of the Graduate School, 1987-88
Associate Vice Chancellor for Research and Dean of the Graduate School Search
Committee, 1987.
Associate Vice Chancellor for Academic Affairs Search Committee, 1987
Director of Federal Relations Search Committee, 1987
IMPART Proposal Review Panel, 1987-88
Council of Associate Deans, 1987-88

PUBLICATIONS - MELVYN C. BRANCH

1. M.C. Branch, "Pressure Transducers in Propulsion Research," *Princeton Engineer*, 24, p. 20, 1965.
2. M.C. Branch and R.F. Sawyer, "Nonequilibrium Combustion Effects on Propellant Performance with Equilibrium, Kinetic, and Frozen Nozzle Flow," *Journal of Spacecraft and Rockets*, 6, pp. 1322-1325, 1969.
3. M.C. Branch and R.F. Sawyer, "Review and Evaluation of Rate Data for Gas Phase Reactions of the N-H System," *AFOSR-TR-0200*, Air Force Office of Scientific Research, Alexandria, VA, 1971.
4. M.C. Branch, "Ammonia Oxidation Kinetics in a High Temperature Flow Reactor," *PhD Thesis*, University of California, Berkeley, 1971.
5. M.C. Branch and R.F. Sawyer, "Developing Laminar and Turbulent Duct Flow with Chemical Reaction," *Astronautica Acta*, 17, 803-810, 1972.
6. M.C. Branch and R.F. Sawyer, "Ammonia Oxidation Kinetics in an Arc Heated Flow Reactor," *14th Symposium (International) on Combustion*, Combustion Institute, Pittsburgh, pp. 967-974, 1973.
7. M.C. Branch and M.M. Behnia, "Analytical Determination of Two Phase Duct Flow and Jet Mixing in Low Speed Flow," *8th JANNAF Plume Technology Conference*, CPIA Pub. 257, pp. 129-139, 1974.
8. M.C. Branch, "Particle Flows in Shear Layers of Exhaust Plumes," Paper No. 75-1234, *American Institute of Aeronautics and Astronautics*, 1975.
9. N.J. Brown, R.D. Matthews, R.F. Sawyer, M.C. Branch, S.M. Banna, "The Formation of Nitrogen Oxides from Fuel Nitrogen," *Report No. EPRI 223-1*, Electric Power Research Institute, Palo Alto, 1976.
10. A. Ganji, J. Short, M.C. Branch and A.K. Oppenheim, "Gas Turbine Combustor Stabilization by Heat Recirculation," *AIAA Journal*, 14, pp. 809-812, 1976.
11. A. Ganji, M.C. Branch, and A.K. Oppenheim, "Design Study of a Gas Turbine Combustor with Heat Recirculation," Paper No. 76-611, *American Institute of Aeronautics and Astronautics*, 1976.
12. N. Ishikawa and M.C. Branch, "An Experimental Determination of the Quenching Distances of Methanol and Iso-Octane/Methanol Blends," *Combustion and Flame*, 27, pp. 65-72, 1976.

13. M.C. Branch, N. Ishikawa and K. Wolfe, "Combustion of Methanol and Methanol Blends in a Stratified Charge Engine," *Proceedings of the 11th Intersociety Energy Conversion Engineering Conference*, AIChE, pp. 115-121, 1976.
14. M.C. Branch and R.A. Ness, "Combustion Front Propagation Through Fractured Oil Shale," Paper No. SPE-6066, *Society of Petroleum Engineers*, 1976.
15. N. Ishikawa and M.C. Branch, "A Simple Model of Transient Thermal Flame Quenching," *SAE Transactions*, 86, pp. 2434-2441, 1977.
16. M.C. Branch, "Sampling from High Temperature, Particle-Laden Flows," *SAND 78-8253*, Sandia Laboratories, Livermore, CA, 1978.
17. D.R. Hardesty, R.J. Cattolica, W.L. Flower, M.C. Branch, H.W. Coleman, L.A. Rahn, A.J. Mulac, R.A. Hill and D.P. Aeschliman, "Second Interim Report: Diagnostics Assessment for Advanced Power Systems," *SAND 78-8206*, Sandia Laboratories, Livermore, CA, 1978.
18. M.C. Branch, "In Situ Combustion Retorting of Oil Shale," *Progress in Energy and Combustion Science*, 5, pp. 193-206, 1979.
19. S.M. Banna and M.C. Branch, "Gas Chromatographic Determination of Nitrogenous Species in Combustion Products," *Combustion Science and Technology*, 24, pp. 15-22, 1980.
20. K. Hayashi and M.C. Branch, "Concentration, Velocity and Particle Size Measurement in Gas-Particle Two-Phase Jets," *Journal of Energy*, 4, pp. 193-198, 1980.
21. M.C. Branch, R.J. Kee and J.A. Miller, "Mixing and Kinetics of the Ammonia-Nitric Oxide Diffusion Jet," Paper No. 80-42, *Western States Section/Combustion Institute*, Fall Meeting, 1980.
22. J.A. Miller, M.C. Branch and R.J. Kee, "A Chemical Kinetic Model for the Selective Reduction of Nitric Oxide by Ammonia," *Combustion and Flame*, 43, pp. 81-98, 1981.
23. Ke Nguyen and M.C. Branch, "Ignition, Propagation and Extinction of Combustion Fronts in Crushed Oil Shale," *Journal of Energy Resources Technology*, 103, pp. 133-137, 1981.
24. S.M. Banna and M.C. Branch, "Mixing and Reaction of NH_3 with NO in Combustion Products," *Combustion and Flame*, 42, pp. 173-181, 1981.
25. K. Hayashi and M.C. Branch, "Particle Transport Effects in Gas-Solid Two-Phase Nozzle and Jet Flow," Paper No. 81-21000, *American Institute of Aeronautics and Astronautics*, 1981.
26. H. Abualhamayel and M.C. Branch, "Structure of Laminar Premixed Flames of Methane, Methanol and Their Blends in Oxygen," *Colloq. Int. Berthelot.*, 1, pp. 172-177, 1981.

27. M.C. Branch, R.J. Kee and J.A. Miller, "A Theoretical Investigation of Mixing Effects in the Selective Reduction of Nitric Oxide by Ammonia," *Combustion Science and Technology*, 29, pp. 147-165, 1982.
28. K. Hayashi and M.C. Branch, "Oblique Shock Waves in Two-Phase Flow," *Progress in Astronautics and Aeronautics*, 87, pp. 22-40, 1983.
29. K. Hayashi and M.C. Branch, "Some Aspects of Heat and Mass Transfer in Gas-Solid Two-Phase Flow," *Proceedings of the ASME/JSME Thermal Engineering Conference*, ASME, pp. 441-449, 1983.
30. J. Seidle and M.C. Branch, "Hydroxyl Concentration Measurements in the $\text{NH}_3/\text{NO}/\text{O}_2$ Reaction in Post Flame Gases," *Combustion and Flame*, 52, pp. 47-57, 1983.
31. J. Gallagher, M. O'Toole and M.C. Branch, "The Effectiveness of Colorado's Air Program on Principal Emissions Control Technologies: Model Years 1968-1982," Paper No. 831699, *Society of Automotive Engineers*, 1983.
32. K. Hayashi and M.C. Branch, "Particle Transport Effects in Gas-Solid Two-Phase Nozzle and Jet Flow," *Israel Journal of Technology*, 21, pp. 136-142, 1983.
33. M.C. Branch and K. Hayashi, "Thermodynamic Derivatives," *International Journal of Mechanical Engineering Education*, 12, pp. 25-34, 1984.
34. K. Nguyen and M.C. Branch, "Ignition Phenomena of Laser-Heated Aluminum Alloy," *Proceedings of the 21st JANNAF Combustion Meeting*, CPIA Pub. 412, 1, pp. 53-61, 1984.
35. M.C. Branch, "Chemical Kinetics of the Gas Phase Decomposition Products of Nitramine Propellants," *Proceedings of the 21st JANNAF Combustion Meeting*, CPIA Pub. 412, 1, pp. 409-415, 1984.
36. Ke Nguyen and M.C. Branch, "Ignition Characteristics of Bulk 302 Stainless Steel in a Pure Oxygen Environment," *Heat Transfer in Fire and Combustion Systems*, ASME HTD-Vol. 45, pp. 19-26, 1985.
37. J.A. Miller and M.C. Branch, W.J. McLean, D.W. Chandler, M.D. Smooke and R.J. Kee, "On Conversion of HCN to NO in $\text{H}_2/\text{O}_2/\text{HCN}/\text{Ar}$ Flames at Low Pressure," *20th Symposium (International) on Combustion*, Combustion Institute, Pittsburgh, pp. 673-684, 1985.
38. Ke Nguyen and M.C. Branch, "A Near-Infrared Two-Color Pyrometer for Determining Ignition Temperatures of Metals and Metal Alloys," *Review of Scientific Instruments*, 56, pp. 1780-83, 1985.

39. Ke Nguyen and M.C. Branch, "Ignition of Bulk 302 Stainless Steel in Oxygen by Laser Heating," *Journal of Heat Transfer*, 108, pp. 478-79, 1986.
40. Ke Nguyen and M.C. Branch, "Ignition Temperature of Bulk 1018 Carbon Steel in Oxygen," *Proceedings of the Eighth International Heat Transfer Conference*, 2, Hemisphere Publishing, CO., pp. 857-62, 1986.
41. M.C. Branch, "Flame Structure Studies by Computer-Controlled Experiments and Numerical Modeling," *Computational Methods and Experimental Measurements*, Springer-Verlag, Berlin, 2, pp. 101-110, 1986.
42. Ke Nguyen and M.C. Branch, "Ignition Temperature of Bulk 6061 Aluminum, 302 Stainless Steel and 1018 Carbon Steel in Oxygen," *Combustion Science and Technology*, 53, pp. 277-277, 1987.
43. M.C. Branch, M. Sadeqi and A. Alfarayedhi, "Laser Induced Fluorescence Measurements of the Structure of $\text{CH}_4/\text{NO}_2/\text{O}_2$ Flames," *Proceedings of the 2nd ASME/JSME Thermal Engineering Conference*, 1, pp. 181-186, 1987.
44. M.C. Branch, A. Alfarayedhi and M. Sadeqi, "Flame Structure and Reaction Kinetics of $\text{CH}_4/\text{NO}_2/\text{O}_2$ and $\text{CH}_2\text{O}/\text{NO}_2/\text{O}_2$ Flames," *Combustion Symposium Joint Conference-Western States and Japanese Sections*, The Combustion Institute, Pittsburgh, pp. 5-7, 1987.
45. M.C. Branch, "Chemical Kinetics of Nitramine Propellants," *Proceedings of the AFOSR/ONR Meeting on Combustion and Rocket Propulsion*, pp. 211-214, 1987.
46. M. Sadeqi and M.C. Branch, "Structure of Laminar Premixed Flames of $\text{CH}_2\text{O}/\text{NO}_2/\text{O}_2$ Mixtures," *Proceedings of the 24th JANNAF Combustion Meeting*, CPIA Pub. 426, 1, pp. 343-351, 1987.
47. L. Thorne, M.C. Branch, J.A. Miller and D. Chandler, "Interaction Between Nitrogen and Carbon Species in H_2/O_2 Laminar Premixed Flames," *21st Symposium (International) on Combustion*, The Combustion Institute, Pittsburgh, pp. 965-977, 1988.
48. M. Sadeqi and M.C. Branch, "A Continuous Flow, Gaseous Formaldehyde Generation System for Combustion Studies," *Combustion and Flame*, 71, pp. 325-29, 1988.
49. M.C. Branch, "Effects of Oxygenated Fuels on Vehicle Emissions and Fuel Economy at High Altitude," *Proceedings of the International Symposium on Thermodynamic Analysis and Improvement of Energy Systems*, Beijing, China, pp. 240-249, 1989.
50. M.C. Branch, F.N. Alasfour and M.A. Habeebullah, "Structure of Laminar Premixed $\text{CH}_4/\text{N}_2\text{O}$ and $\text{CH}_2\text{O}/\text{N}_2\text{O}$ Flames," *Proceedings of the Joint Meeting of the British and French Sections of the Combustion Institute*, The Combustion Institute, Pittsburgh, pp. 167-170, 1989.

51. M.C. Branch, M.A. Habeebullah, F.N. Alasfour, A. Daghouche and H.Dindi, "Structure of Model Gas Flames Associated with Nitramine Propellants: CH₄, CH₂O and CO with NO₂, N₂O and O₂," *Proceedings of the 26th JANNAF Combustion Meeting*, CPIA Pub. No. 529, 1, pp. 83-92, 1989.
52. H. Dindi, H.M. Tsai and M.C. Branch, "Combustion Mechanisms of Carbon Monoxide-Nitrous Oxide Flames," *Proceedings of the 27th JANNAF Combustion Meeting*, CPIA Pub.No. 557, Vol. 3, pp. 87-90, 1990.
53. M.C. Branch, A. Alfarayedhi, M. Sadeqi and P.J. Van Tiggelen, "Measurements of the Structure of Laminar Premixed Flames of CH₄/NO₂/O₂ and CH₂O/NO₂/O₂ Mixtures," *Combustion and Flame*, 83, pp. 228-239, 1991.
54. M.B. Habeebullah, F.N. Alasfour and M.C. Branch, "Structure and Kinetics of CH₄/N₂O Flames," *23rd Symposium (International) on Combustion*, The Combustion Institute, Pittsburgh, pp. 371-378, 1991.
55. H. Dindi, H.M. Tsai and M.C. Branch, "Combustion Mechanisms of Carbon Monoxide-Nitrous Oxide Flames," *Combustion and Flame*, 87, pp. 13-20, 1991.
56. J. Vandooren, M.C. Branch and P.J. Van Tiggelen, "Comparisons of the Structure of Stoichiometric CH₄-N₂O-Ar and CH₄-O₂-Ar Flames by Molecular Beam Sampling and Mass Spectrometric Analysis," *Combustion and Flame*, 90, pp. 247-258, 1992.
57. M.C. Branch and J.J. Cor, "Structure and Chemical Kinetics of Flames Supported by Nitrogen Oxides," *Pure and Applied Chemistry*, 65, pp. 277-283, 1993.
58. J.V. Volponi and M.C. Branch, "Flame Structure of C₂H₂-O₂-Ar and C₂H₂-NO₂-Ar Laminar Premixed Flames," *24th Symposium (International) on Combustion*, Combustion Institute, Pittsburgh, pp. 823-831, 1993.
59. A. Abbud-Madrid, J.C. Branch, T.S. Feiereisen and J.W. Daily, "A Study of Ignition Phenomena of Bulk Metals by the Use of a Non-Coherent, Continuous Radiation Source," *Flammability and Sensitivity of Materials in Oxygen-Enriched Atmospheres*, ASTM STP 1197, Dwight D. Janoff and Joel M. Stoltsfus, Eds., American Society for Testing and Materials, Philadelphia, pp. 211-222, 1993.
60. T.S. Feiereisen, M.C. Branch, A. Abbud-Madrid and J.W. Daily, "Gravitational and Pressure Effects on the Heat Up Rate of Metal Test Specimens in a Pure Oxygen Atmosphere," *Flammability and Sensitivity of Materials in Oxygen-Enriched Atmospheres*, ASTM STP 1197, Dwight D. Janoff and Joel M. Stoltsfus, Eds., American Society for Testing and Materials, Philadelphia, pp. 196-210, 1993.

61. M.C. Branch and S. Mallik, Combustion Chemistry of Fuel Additives for Reduced Engine Emissions, *Compact Fired Heating Systems, Proceedings of the EURO THERM Seminar No. 35*, Katholieke Universiteit Leuven, Belgium, 1994.
62. A. Abbud Madrid, G.J. Fiechtner, M.C. Branch, and J.W. Daily, Ignition Characteristics of Pure Bulk Metals: Normal Gravity Test Results, \cong *AIAA Paper No. 94-0574*, 32nd Aerospace Sciences Meeting and Exhibit, Reno, January 10-13, 1994.
63. J.V. Volponi and M.C. Branch, "Flame Structure of H₂-NO₂-Ar and H₂-O₂-Ar Laminar Premixed Flames," *Combustion Science and Technology*, 105, pp. 195-209, 1995.
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