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23. "LNG Cold Recovery Air Separation Unit", R. Agrawal, M. R. Alvarez and R.M. McGuinness, AIChE Spring Meeting, Atlanta, GA (1994).

24. "Novel Membrane Schemes for Higher Purity/Recovery Separations", J. Xu and R. Agrawal, Sixth Annual Meeting of the North American Membrane Society, Breckenridge, CO (1994).

25. "Separation Devices for Gas Mixing", R. Agrawal and J. Xu, 1994, Gordon Research Conference on Separation and Purification, Colby-Sawyer College, New London, NH (1994).

26. "Analysis of Alternative Column Design Utilizing Waste Heat in Distillation", Z. T. Fidkowski and R. Agrawal, Paper # 30d, AIChE Spring National Meeting, Houston, TX (1995).

27. "Novel Membrane Cascades for Gas Separation and Their Thermodynamic Analysis", J. Xu and R. Agrawal, Seventh Annual Meeting of the North American Membrane Society, Portland, OR (1995).

28. "Efficient Process to Produce Tonnage Nitrogen", R. Agrawal and D. W. Woodward, 19th International Congress of Refrigeration, The Hauge, The Netherlands, August 20-25, 1995.

29. "Local Thermodynamic Efficiency of Permeation and Membrane Separator Design", J. Xu and R. Agrawal, Paper # 23c, 1995 Annual AIChE Meeting, November 12-17, Miami Beach, FL.

30. "Synthesis of a Distillation Column Configuration for a Multi-component Separation", Paper # 187e, 1995 Annual AIChE Meeting, November 12-17, Miami Beach, FL.

31. "Energy Integrated Distillation Systems - Lower Energy Requirements without Changing Temperatures of Utilities", Paper # 189g, 1995 Annual AIChE Meeting, November 12-17, Miami Beach, FL.

32. "A Method to Draw Gas Separation Membrane Cascades with Limited Number of Compressors", R. Agrawal and J. Xu, Eighth Annual Meeting of the North American Membrane Society, Ottawa, Canada (1996).

33. "A Systematic Procedure for Drawing Gas Separation Membrane Cascades with Limited Number of Compressors", R. Agrawal and J. Xu, Paper # S-4-2-1, 1996 International Congress on Membranes and Membrane Processes, ICOM'96, August 18-23, Yokohama, Japan.

34. "Production of Ultra-high Purity Nitrogen Free of Light Impurities", R. Agrawal, D. W. Woodward and A. Modi, MUST'96, Munich Meeting on Air Separation Technology, October 10-11, 1996.

35. "Columns with Intermediate Heat Exchangers for Separation of a Tangent Pinch Mixture", R. Agrawal and Z. T. Fidkowski, Paper # 5b, 1996 Annual AIChE Meeting, November 10-15, Chicago, IL.

36. "A Method to Synthesize Gas Separation Membrane Cascade Structures with Small Number of Compressors", Paper # 25d, 1996 Annual AIChE Meeting, November 10-15, Chicago, IL.

37. “Study of Binary Distillation through Thermodynamic Efficiency,” R. Agrawal and D. M. Herron, Eleventh Intersociety Cryogenic Symposium, Houston, January 28-30, 1997.

38. “Study of Binary Distillation through Thermodynamic Efficiency,” R. Agrawal and D. M. Herron, 1997 Spring National AIChE Meeting, Houston, March 9-13, 1997.

39. “Coproduction of High Purity Products Using Thermally-Linked Columns,” R. Agrawal, D. W. Woodward and A. K. Modi, International Symposium on Distillation and Absorption, Institution of Chemical Engineers, Maastricht, The Netherlands, September 8-10, 1997.

40. “Optimum Configuration for Addition or Removal of Heat from an Intermediate Location of a Binary Distillation Column,” R. Agrawal and D. M. Herron, Paper #198e, 1997 Annual AIChE Meeting, November 16-21, Los Angeles, CA.

41. “Advanced Cryogenic Air Separation Plants for Carbonaceous Fuel-Based Ammonia Synthesis,” J. Xu and R. Agrawal, Cryogenics and Refrigeration Conference, ICCR’98, Hangzhou, China, April 21-24, 1998.

42. “Thermally Coupled Columns: Are They Always Efficient?,” R. Agrawal and Z. T. Fidkowski, Annual AIChE Meeting, November 16-20, 1998, Miami Beach, FL.

43. “More Operable Arrangements of Thermally Coupled Distillation Columns”, R. Agrawal and Z. T. Fidkowski, AIChE Spring National Meeting, March 1999, Houston, TX.

44. "Improving Efficiency of Distillation with New Thermally Coupled Configurations and Columns", R. Agrawal and Z. T. Fidkowski, FOCAPD '99 Computer-Aided Design in the 21st Century, July, 1999, Breckenridge, Colorado.

45. "Production of Low-Purity Oxygen in the Next Millennium", R. Agrawal and D. M. Herron, 20th International Congress of Refrigeration, September, 1999, Sydney, Australia.

46. "Simplified Thermally Coupled Arrangement for Ternary Distillation", R. Agrawal and Z. T. Fidkowski, Annual AIChE Meeting, November, 1999, Dallas, TX.

47. "Nitrogen Liquefaction Processes", R. Agrawal, D. M. Herron, A. A. Brostow and M. J. Roberts, International Cryogenic Engineering Conference (ICEC18), Mumbai, India, February, 2000.

48. "Multi-component Thermally Coupled Systems of Distillation Columns at Minimum Reflex", Z. T. Fidkowski and R. Agrawal, Paper #242C, AIChE Annual National Meeting, Nov. 2000, Los Angeles, CA.

49. "Further Reduction in Heat Demand of Thermally Coupled Configurations through Double-Effect Distillation", R. Agrawal, Paper #246a, AIChE Annual National Meeting, Nov. 2000, Los Angeles, CA.

50. "Column Configurations for Ternary Distillation with the Same Number of Reboilers – Condensers", Z. T. Fidkowski and R. Agrawal, Paper #1f, AIChE Spring Meeting, April 2000, Houston, TX.

51. "Reducing Heat Duty of Conventional Multi-component Distillation Columns with No Thermal Coupling", R. Agrawal, Paper 1b, AIChE Spring Meeting, April 2000, Houston, TX.

52. "Feed Pretreatment for Binary Distillation Efficiency Improvement", R. Agrawal and D. M. Herron, ESCAPE 11, May 2001, Kolding, Denmark.

53. "Hybrid Cryogenic Liquefaction Processes", R. Agrawal, A. A. Brostow, D. M. Herron and M. J. Roberts, XXI IIR International Congress of Refrigeration, August 2003, Washington, DC.

54. "Synthesis of Multicomponent Distillation Column Configurations", R. Agrawal, AIChE Annual National Meeting, Nov. 2003, San Francisco, CA.

55. "Partially Thermally Coupled Systems of Distillation Columns", R. Agrawal and Z. T. Fidkowski, AIChE Annual National Meeting, Nov. 2003, San Francisco, CA.

56. "Particle Swarm Optimization in Discontinuous Function Spaces", A, Giridhar, B. B. Krishnamurthy, R. Agrawal, V. Venkatasubramanian, AIChE Annual National Meeting, Nov. 2005, Cincinnati, OH.

57. "Formulation of Search Spaces for Separation Networks", A. Giridhar, V. Venkatasubramanian, R. Agrawal, AIChE Annual National Meeting, Nov. 2005, Cincinnati, OH.

58. “A Novel Search Space Formulation for the Synthesis of Separation Networks”, A. Giridhar, R. Agrawal, V. Venkatasubramanian, AIChE Annual National Meeting, Nov. 2006, San Francisco, CA.

59. “New Energy-Efficient and Low-Cost Multicomponent Distillation Configurations”, A. Giridhar and R. Agrawal, AIChE Spring National Meeting, April 2007, Houston, TX.

60. “Synthesis of Optimal Distillation Networks”, A. Giridhar and R. Agrawal, AIChE Annual National Meeting, Nov. 2007, Salt Lake City, UT.

61. “Development of Low-Cost CuInSe2 Nanocrystal-Ink Based Solar Cells”, R. Agrawal, H. Hillhouse, Q. Guo, and M. Kar, AIChE Annual National Meeting, Nov. 2007, Salt Lake City, UT.

62. “New Insights into the Ideal Cascade Theory for Membrane Separation Processes”, R. Pathare and R. Agrawal, AIChE Annual National Meeting, Nov. 2007, Salt Lake City, UT.

63. “An Environmentally Friendly Novel Route for the Transportation Fuel”, R. Agrawal, N. Singh, F. Ribiero, and W. N. Delgass, AIChE Annual National Meeting, Nov. 2007, Salt Lake City, UT.

64. “New and Novel Batch Distillation Processes”, R. Agrawal and G. S. Joglekar, AIChE Annual National Meeting, Nov. 2007, Salt Lake City, UT.

65. “Reducing Energy Consumption by New Distillation Configurations”, L. Zhang, A. Linninger and R. Agrawal, 11th Topical on Refinery processing, AIChE Annual Spring Meeting, 9th April, 2008, New Orleans, LA.

66. “Developing Membrane Separation Process fundamentals for Energy Savings’, R. Pathare and R. Agrawal, Gordon Research Conference on Membranes: Materials and Processes, August,2008, New London, NH

67. "Membrane Cascade Design Fundamentals for Energy Savings", R. Pathare and R. Agrawal, AIChE Annual National Meeting, Nov. 2008, Philadelphia, PA

68. "A Computationally Efficient Method to Generate a Complete Search Space for Multicomponent Distillation Sequences", V. Shah, A. Giridhar and R. Agrawal, AIChE Annual National Meeting, Nov. 2008, Philadelphia, PA

69. "Dynamic Modeling and Optimization of Thermally Coupled Dual-Column Batch Distillation Processes", G. Joglekar and R. Agrawal, AIChE Annual National Meeting, Nov. 2008, Philadelphia, PA

70. "Synergistic Use of Solar Hydrogen with Biomass to Produce Biofuels", N. R. Singh, F.H. Ribeiro, W. N. Delgass and R. Agrawal, AIChE Annual National Meeting, Nov. 2008, Philadelphia, PA

71. “Efficiency comparison of distillation schemes: heat integrated distillation column (HIDiC)and heat pump systems” R. Agrawal, A. Shenvi and D. Michael Herron, AIChE Spring National Meeting, April 2009, Tampa. Fl

72. “Synthesis and quick identification of low-energy sequences for multicomponent distillation”, V. Shah and R. Agrawal, AIChE Spring National Meeting, April 2009, Tampa. Fl

73. “Dynamic Modeling and Optimization of Thermally Coupled Dividing Wall Column Batch Distillation Processes”, R. Agrawal and G. S. Joglekar, AIChE Spring National Meeting, April 2009, Tampa. Fl

74. “Membrane Cascade Synthesis Fundamentals for Energy Savings”, R. Pathare and R. Agrawal, NAMS 2009, June 2009, Charleston, SC

75. “Selenization of Copper Indium Gallium Disulfide Nanocrystal Films for Thin Film Solar Cells”, Q.J. Guo, G. M. Ford, H. W. Hillhouse and R. Agrawal, PVSC 34, June 2009, Philadelphia, Pa

76. "Synergistic Routes to Liquid Fuel for a Petroleum Deprived Future", N.R. Singh and R. Agrawal, AIChE Annual Meeting, November 2009, Nashville, TN

77. “Reaction Mechanism for the Formation of CuInSe2 Nanocrystals for Low-Cost Solar Cells”, M. Kar, H. W. Hillhouse and R. Agrawal, AIChE Annual Meeting, November 2009, Nashville, TN

78. “Energy Efficient Membrane Cascade Design for Binary and Multicomponent Applications”, R. Pathare and R. Agrawal, AIChE Annual Meeting, November 2009, Nashville, TN

79. “Thermal Coupling in Multicomponent Distillation Sequences”, V.H. Shah and R. Agrawal, AIChE Annual Meeting, November 2009, Nashville, TN

80. “Heat Integrated Distillation Column (HIDiC) Versus Heat Pump Systems”, A. A. Shenvi, D. M. Herron and R. Agrawal, AIChE Annual Meeting, November 2009, Nashville, TN

81. “CIGS Nanocrystal Inks for the Fabrication of Air Stable Thin Film Solar Cells”, Q. J. Guo, H. W. Hillhouse and R. Agrawal, AIChE Annual Meeting, November 2009, Nashville, TN

82. “Systems Approach Toward Maximizing Liquid Fuel Yield from Biomass", D. S. Mallapragada, W. N. Delgass, F. H. Ribeiro, and R. Agrawal, Frontiers in Bioenergy Symposium, May 2010, Purdue University, IN.

83. “Solar Cells via Selenization of $CuInS_2$ Nanocrystals: Effect of Synthesis Precursor”, G. M. Ford, Qijie Guo, R. Agrawal and H. W. Hillhouse, PVSC 35, June 2010, Honolulu, Hawaii

84. “ Finding Globally Optimal Minimum Heat Duty for Multicomponent Distillation Sequences”, Ulaganathan Nallasivam, Vishesh H. Shah, Mohit Tawarmalani, Rakesh Agrawal, AIChE Annual Meeting, November 2010, Salt Lake City, Utah.

85. “The Scope of Using Concentrated Solar Energy to Produce Liquid Fuels from Biomass”, Dharik, Mallapragada, W. Nicholas Delgass, Fabio H. Ribeiro, Rakesh Agrawal, AIChE Annual Meeting, November 2010, Salt Lake City, Utah.

86. “ A Method for Multicomponent Distillation Sequences with Fewer Columns”, Anirudh A. Shenvi, Vishesh H. Shah, Jeremy Zeller, Rakesh Agrawal, AIChE Annual Meeting, November 2010, Salt Lake City, Utah.

87. “Energy Systems Analysis for a Renewable Transportation Sector”, D. S. Mallapragada, N. R. Singh and R. Agrawal, Proceedings 21st European Symposium on Computer Aided Process Engineering- ESCAPE-21, May 2011, Porto Carras, Chalkidiki, Greece, 2011

88. “A Generalized and Robust Method for Efficient Photovoltaic Devices from Multinary Sulfide Nanocrystal Inks”, Q. J. Guo, G. M. Ford, H. W. Hillhouse, and R. Agrawal, PVSC 37 Conference, June, 2011, Seattle, WA.

89. “Analyzing Phase Transformation in the Growth of CIGSe Films from Nanocrystals”, Bryce C. Walker, Erik Sheets, Rakesh Agrawal, AIChE Annual Meeting, October 2011, Minneapolis, MN.

90. “Band Gap Tuning with CZTS- Based Nanocrystal-Ink Solar Cells”, Grayson Ford, Rakesh Agrawal, Hugh W. Hillhouse, AIChE Annual Meeting, October 2011, Minneapolis, MN.

91. “High-Pressure Catalytic Hydrodeoxygenation of the Hydro-Pyrolysis Vapor Lignin Model Compounds”, Sara L. Yohe, W. Nicholas Delgass, Fabio H. Ribeiro, Rakesh Agrawal, AIChE Annual Meeting, October 2011, Minneapolis, MN.

92. “High-Pressure Fast Pyrolysis and Fast Hydropyrolysis for Conversion of Biomass to Liquid Fuels”, Vinod Kumar Venkatakrishnan, Andrew D. Smeltz, Sergey V. Semikolenov, Fabio H. Ribeiro, W. Nicholas Delgass, Rakesh Agrawal, AIChE Annual Meeting, October 2011, Minneapolis, MN.

93. “Direct Production of Molecules in the Fuel Range by Selective Tailoring of Biomass Fast Pyrolysis”, Piotr Gawecki, Fabio Ribeiro, W. Nicholas Delgass, Rakesh Agrawal, Andrew Smeltz, Matthew R. Hurt, David J. Borton II, Nelson R. Vinueza, Hilkka I. Kenttamaa, Nicholas J. Nugent, William E. Anderson, AIChE Annual Meeting, October 2011, Minneapolis, MN.

94. “A Method for Novel Multicomponent Distillation Sequences with Fewer Columns”, Anirudh A. Shenvi, Vishesh H. Shah, Rakesh Agrawal, AIChE Annual Meeting, October 2011, Minneapolis, MN.

95. “In-Situ Measurements of CZTSSe Film Formation from CZTS Nanoparticles”. Bryce Walker, Rakesh Agrawal, Roland Mainz, Humberto Rodriguez-Alvarez, Alfons Weber, Ole Zander, Cornelia Streeck, Thomas Unold, Hans-Werner Schock, MRS Spring Conference, April, 2012,, San Francisco, CA.

96. “Low-cost and Earth-abundant Solar Cells Utilizing Nanoparticle Precursors”, W.C. Yang, N. J. Carter, C. J. Hages, E. J. Sheets, K. W. brew, B. C. walker, H. Y. Park, J. M. Moore, and R, Agrawal, NSF IGERT Project Meeting, 2012, Washington DC,

97. “Band Alignment Limitations and Light-Soaking Effects in CZTSSe and CZTGeSSe”, C. J. Hages, J. E. Moore, S. Dongaonkar, M. A. Alam, M. S. Lundstrom and R. Agrawal, PVSC 38 Conference June 2012, Austin,TX. (This paper won the best poster paper award)

98. “Influence of Ge Doping on the Defect Distributions of Cu2Zn(Snx Ge1-x)(Sy Se1-y) Fabricated by Nanocrystal Ink Deposition”, J. E. Moore, C. J. Hages, M. S. Lundstrom and R. Agrawal, PVSC 38 Conference June 2012, Austin,TX. (This paper won the best oral presentation by a graduate student).

99. “Grain Growth Enhancement of Selenide CIGSe Nanoparticles to Densified Films Using Copper Selenides”, B. Walker, and R. Agrawal, PVSC 38 Conference June 2012, Austin,TX.

100. “Reverse Stress Metastability of Shunt Current in CIGS Solar Cells”, S. Dongaonkar, E. Sheets, R. Agrawal, and M. A Alam, PVSC 38 Conference June 2012, Austin,TX. (This paper was nominated for the best poster paper award).

101. “Synthesis Routes of Phosphorous-Free Semiconducting Selenide Nanoparticles for Photovoltaic Applications” B. C. Walker, S. M. Szcepaniak, B. Negash, S. M. McLeod, and R. Agrawal, AIChE Annual Meeting, October, 2012.

102. “Improved Performance of Earth-Abundant $Cu_2ZnSn(S_xSe_{1-x})_4$ Solar Cells Through Ge Incorporation”, C. Hages and R. Agrawal, AIChE Annual Meeting, October, 2012.

103. “Systematic Synthesis of Augmented Biomass-to-Liquid Fuel Processes” D. Mallapragada, W. N. Delgass, F. H. Ribeiro and R. Agrawal, AIChE Annual Meeting, October, 2012.(This paper was judged as the Best Presentation in the session)

104. “Design of Efficient Systems for Multicomponent Distillation”, G. Rampriya, M. Tawarmalani and R. Agrawal, AIChE Annual Meeting, October, 2012.

105. “Kinetics of High Pressure Catalytic Reaction Pathways for Dihydroeugenol Over Pt/ZrO2”, S. Yohe, R. Agrawal, W. N. Delgass, and F.H. Ribeiro, AIChE Annual Meeting, October, 2012.

106. “New Class of Thermal Coupling Links in Multicomponent Distillation”, J. Huff, M. Tawarmalani, and R. Agrawal, AIChE Annual Meeting, October, 2012.

107. “Limiting Efficiencies for Solar Thermal Energy Conversion to Fuels”, D. Mallapragada, and R. Agrawal, AIChE Annual Meeting, October, 2012.

108. “Copper-zinc-tin Chalcogenide Absorbers Derived from Controlled Sulfide Nanocrystals of Wurtzite and Kesterite Structures”, W.-C. Yang, C. K. Miskin, C. J. Hages, E. A. Stach, and R. Agrawal, MRS Fall Meeting, November, 2012.

109. “Real-time Investigation of the Sintering Mechanism in Cu-Zn-Sn-S Nanocrystal Films for Photovoltaic Applications”, N. J. Carter, R. Mainz, B. C. Walker, W.C. Yang, A. Weber, O. Zander, S. Schmidt, E. A. Stach, T. Unold, and R. Agrawal, MRS Spring Meeting, April, 2013.

110. “Analysis of Recombination in $Cu_2ZnSn_{1-x}Ge_xS_ySe_{4-y}$ thin films by Photoluminescence Spectroscopy”, C. J. Hages, S.Levcenco, T. Unold, and R. Agrawal, MRS Spring Meeting, April, 2013.

111. “Novel Metal-selenide Nanoparticle Synthesis from Phosphorous-free Routes”, B. C. Walker, and R. Agrawal, MRS Spring Meeting, April, 2013.

112. “Scalable Photovoltaics through Nanotechnology”, B. C. Walker, and R. Agrawal, MRS Spring Meeting, April, 2013.

113. “GWh Level Renewable Energy Storage and Supply using Liquid CO_2”, E Al-musleh, D.S. Mallapragada and R. Agrawal, 23rd European Symposium on Computer Aided Process Engineering –ESCAPE 23, June 9-12, Lappeenranta, Finland, 2013

114. "Analysis of Temperature-Dependent Current-Voltage Characteristics for CIGSSe and CZTSSe Thin Film Solar Cells from Nanocrystal Inks", N. J. Carter, C. J. Hages, J. E. Moore, S. M. McLeod, C. K. Miskin, C. Joglekar, M. S. Lundstrom, and R. Agrawal, 39th IEEE Photovoltaic Specialist Conference, Tampa, Fl, 2013.

115. "High Efficiency $Cu_2ZnSnS4$ Nanocrystal Ink Solar Cells through Improved Nanoparticle Synthesis and Selenization," C. K. Miskin, N. J. Carter, W.C. Yang, C. J. Hages, E. Stach, and R. Agrawal, 39th IEEE Photovoltaic Specialist Conference, Tampa, Fl, 2013.

116. “Device Comparison of Champion Nanocrystal-Ink based CZTSSe and CIGSSe Solar Cells: Capacitance Spectroscopy”, C. J. Hages, N. J. Carter, S. M. McLeod†, C. K. Miskin, C. Joglekar, and R. Agrawal, 39th IEEE Photovoltaic Specialist Conference, Tampa, Fl, 2013.

117. “The Physics of Vbi-Related IV Crossover in Thin Film Solar Cells: Applications to Ink Deposited CZTSSe”, J. Moore, C. J. Hages, N. Carter, R. Agrawal and M. Lundstrom, 39th IEEE Photovoltaic Specialist Conference, Tampa, Fl, 2013.

118. “CZTSe Devices Fabricated From CZTSSe Nanoparticles”, B. C. Walker, B. G. Negash, S. M. Szczepaniak, K. W. Brew and R. Agrawal, 39th IEEE Photovoltaic Specialist Conference, Tampa, Fl, 2013.

INVITED LECTURES

1. "Use of Exergy in Synthesis of Large Nitrogen Generators", Seminar at the University of California at Los Angeles, California (1991).

2. "Multi-component Separation by Heat Integrated Distillation Columns", Seminar at the University of California at Davis, California (1991).

3. "Influence of Chemical Engineering Education at Delaware on my Career", a talk at the College of Engineering Centennial Celebration, University of Delaware, February 1993.

4. "Separation Devices for Gas Mixing", Seminar at the West Virginia University, Morgantown, WV (1994).

5. "Membrane Cascades for Gas Separation", Seminar at the University of Massachusetts, Amherst, MA (1996).

6. "Membrane Cascades for Gas Separation", Paper at the 41st Gordon Research Conference on Separation and Purification, Colby-Sayer College, New London, New Hampshire, August 5, 1998.

7. "Efficiency and Operability of Complex Column Arrangements for Ternary Distillation", E. I. Du Pont de Nemours and Company, March 1999.

8. "Hybrid Separation Processes" NSF Workshop, July 1999, Breckenridge, Colorado.

9. "New Configurations for Multi-component Distillation" University of Pennsylvania, April 2000.

10. "New Distillation Column Arrangements for Multi-component Separation", Auburn University, May 2000.

11. "Synthesis of Useful Membrane Cascades for Gas Separation", University of Notre Dame, October 2000.

12. "Some Recent Developments in Multi-component Distillation", Georgia Institute of Technology, January, 2001.

13. "Double-effect Distillation for Ternary Separations", Carnegie-Mellon University, March 2001.

14. "New Configurations for Multi-component Distillation" Symposium in honor of Professor Stanley I. Sandler, University of Delaware, April 2001.

15. "New Distillation Configurations for Multi-component Separations", Alkyl Amines, Padma Bhushan Professor B. D. Tilak Chemcon Distinguished Speaker, Chemcon-2001, Indian Institute of Chemical Engineers, December 2001.

16. "Synthesis of Useful Membrane Cascades for Gas Separation", University of Delaware, February 2002.

17. “Membrane Cascades for Gas Separation”, Lehigh University, February 2002.

18. “New Multi-component Distillation Column Arrangements”, Plenary Lecture, Process Modeling Center, Lehigh University, March 2002.

19. “Some Recent Developments in Multi-component Distillation”, *Bayer Lecture*, Carnegie-Mellon University, April 2002.

20. “Recent Developments in Multicomponent Distillation Configurations”, Purdue University, April 2003.

21. “Membrane Cascades with Limited Number of Recycle Compressors,” Sunoco, June, 2003

22. “Multicomponent Distillation Configurations,” Sunoco, June, 2003.

23. “The Hydrogen Economy: Opportunities, Costs, Barriers, and R&D Needs”, Regents Lecture, University of California, Los Angeles, CA, 2004.

24. “Hydrogen As An Energy Carrier – Its Promises and Challenges”, FOCAPD, Princeton, 2004.

25. “Hydrogen As An Energy Carrier – Its Promises and Challenges”, Distinguished Faculty Seminar: Advanced Power Sources, University of Michigan, Ann Arbor, 2004.

26. “Synthesis of Multicomponent Distillation Column Configurations”, City College, New York, 2004.

27. “Hydrogen As An Energy Carrier – Its Promises and Challenges”, Inaugural address in the Hydrogen seminar series at Purdue University, 2004.

28. “Synthesis of Multicomponent Distillation Column Configurations”, Keynote address at the joint IIChE/AIChE conference in Mumbai, India 2004.

29. “Hydrogen As An Energy Carrier – Its Promises and Challenges”, Keynote address at the joint IIChE/AIChE conference in Mumbai, India 2004.

30. “Energy-Some Challenges and Research Opportunities”, Invited talk in the Energy workshop at the joint IIChE/AIChE conference in Mumbai, India 2004.

31. “Synthesis of Useful Membrane Cascades for Gas Separation”, Professor B. D. Tilak Visiting Fellowship lecture, Institute of Chemical Technology, University of Mumbai, India, 2004.

32. “Hydrogen As An Energy Carrier – Its Promises and Challenges”, Ohio State University, 2005.

33. “Hydrogen As An Energy Carrier – Its Promises and Challenges”, Opening Plenary Lecture, International Chemical Engineering Conference – VI, Tec de Monterrey, Mexico, 2005.

34. “Separation: Perspective of a Process developer/Designer”, Invited keynote lecture at the ACS Symposium, San Diego, CA, 2005.

35. “The Challenges in the Synthesis of Multicomponent Separation Configurations in Chemical Industry”, Winthrop E. Stone Lecture, Purdue University, 2005.

36. “Hydrogen as an Energy Carrier – Its Promises and Challenges”, Othmer Department of Chemical Sciences & Engineering, Polytechnic University, New York, 2005.

37. “Hydrogen as an Energy Carrier – Its Promises and Challenges”, Clarkson University, Potsdam, NY, 2005.

38. “Synthesis of Multicomponent Distillation Column Configurations”, Department of Chemical Engineering, Clarkson University, Potsdam, NY, 2005.

39. “Separation: Perspective of a Process developer/Designer”, Invited keynote lecture at the China/USA/Japan Joint Chemical Engineering Conference, Beijing, China, October 2005.

40. “Energy Supply Challenges and Opportunities”, Institute Lecture, AIChE Annual Meeting, Cincinnati, 2005.

41. “Hydrogen as an Energy Carrier – Its Promises and Challenges”, Society of Automotive Engineers, Fort Wayne, IN, 2006.

42. “The Challenges in the Synthesis of Multicomponent Separation Configurations in Chemical Industry” University of Colorado, Boulder, Co., 2006

43. “Separation: Perspective of a Process developer/Designer”, Department of Chemical Engineering, Tianjin University, Tianjin, China, May,2006.

44. “Energy Supply Challenges and Opportunities”, Peking University, Beijing, China, May 2006.

45. “Energy Supply Challenges and Opportunities”, Department of Chemical Engineering, Tsinghua University, Beijing, China, May, 2006.

46. “Separation: Perspective of a Process developer/Designer”, Department of Chemical Engineering, Tsinghua University, Beijing, China, May, 2006.

47. “Energy Supply Challenges and Opportunities for Chemical Engineers”, Invited plenary lecture at the 4th Pacific Basin Conference on Adsorption Science and Technology, Tianjin, China, 2006.

48. “Energy Supply Challenges and Opportunities”, Keynote lecture at Summit on Energy Sustainability, Texas Tech University, Lubbock, Tx, September, 2006.

49. “Environmentally Friendly Energy Solutions”, Keynote lecture at Chemical Heritage Foundation Innovation Conference, Philadelphia, Pa, September, 2006.

50. “Environmentally Friendly Energy Solutions”, Department of Chemical Engineering, Illinois Institute of Technology, Chicago, October, 2006.

51. “The Challenges in the Synthesis of Multicomponent Separation Configurations in Chemical Industry”, Session in honor of Gerhold Award Winners, AIChE annual meeting, San Francisco, Nov. 2006.

52. “New Energy-Efficient and Low-Cost Multicomponent Distillation Configurations” Texas Technology Showcase, Galveston, TX, Dec. 2006.

53. “Environmentally Friendly Energy Solutions”, NRC Board on Energy and Environmental Systems, Washington D.C., Dec. 2006.

54. “Separations: Perspective of a Process Developer/Designer”, University Institute of Chemical Technology, Mumbai, India, Jan. 2007.

55. “The Challenges in the Synthesis of Multicomponent Separation Configurations in Chemical Industry”, University Institute of Chemical Technology, Mumbai, India, Jan. 2007.

56. “Hydrogen as an Energy Carrier – Its promises and challenges”, University Institute of Chemical Technology, Mumbai, India, Jan. 2007.

57. “Environmentally Friendly Energy Solutions”, Shri M.V. Mariwala Visiting Professorship Lecture, University Institute of Chemical Technology, Mumbai, India, Jan. 2007.

58. “Use of Sustainable Hydrogen to Produce Liquid Biofuels”, Keynote Lecture, Second Energy Center Hydrogen Initiative Symposium, Purdue University, April 2007.

59. “New Design Methods and Algorithms for Highly Energy-efficient and Low-cost Multicomponent Distillation Processes”, Department of Energy, Houston, April, 2007.

60. “Environmentally Friendly Energy Solutions”, Technology Day Lecture, Indian Institute of Petroleum, Dehradun, India, May 2007.

61. “The Challenges in the Synthesis of Multicomponent Separation Configurations in Chemical Industry”, Dow Chemical Company, Midland, MI., May 2007.

62. “An Environmentally Friendly Novel Route for the Transportation Fuel”, NETL, Pittsburgh, PA, May 2007.

63. “Environmentally Friendly Energy Solutions”, Dow Chemical Company, Midland, MI., Sept. 2007.

64. “Environmentally Friendly Energy Solutions”, Achievement Award Lecture, Industrial Research Institute, Lincolnshire, IL, Oct. 2007.

65. “Environmentally Friendly Energy Solutions”, University of Southern California, Lyman Handy Colloquium Series Lecture, Los Angeles, CA, Dec. 2007.

66. “Development of Low-Cost CuInSe2 Nanocrystal-Ink Based Solar Cells”, Chemcon 2007, Kolkota, India, Dec. 2007.

67. “Environmentally Friendly Energy Solutions”, Dept. of Chemical Engineering and Material Science, University of Minnesota, Minneapolis, MN, Jan. 2008.

68. “Energy Saving Opportunities in Multicomponent Distillation: Optimum configuration and Thermal Coupling between Distillation Columns”, ExxonMobil, Annandale, NJ, Feb. 2008.

69. “Thermochemical Methods for Biofuel Production from Biomass”, 2008 AAAS Annual Meeting, Boston, MA, Feb. 2008.

70. “Energy Saving Opportunities in Multicomponent Distillation: Optimum Configuration and Thermal Coupling Between Distillation Columns”, Dow Chemical Company, Midland, MI, April 2008.

71. “Environmentally Friendly Transportation Fuels’, AIChE Fuels and Petrochemicals Division Award Lecture, New Orleans, LA, April 2008.

72. “Environmentally Friendly Energy Solutions”, Department of Chemical and Environmental Engineering, University of Arizona, Tucson, AZ, May 2008.

73. “Environmentally Friendly Energy Solutions”, Department of Chemical and Environmental Engineering, University of California, Riverside, CA, May 2008.

74. ‘Transportation Fuel in a Fossil Fuel Deprived World”, MPR Associates, Alexandria, VA, June 2008.

75. “Environmentally Friendly Energy Solutions”, Foundations of Computer-Aided Process Operations (FOCAPO), Boston, MA, July 2008.

76. “Energy Systems Analysis”, Pan American Institute (PASI) Workshop, Mar Del Plata, Argentina, August 2008. (*Voted as the best presentation by over 50 international graduate students attending the workshop*).

77. “Experimental Studies of Coal and Biomass Fuel Synthesis and Flame Characterization for Aircraft Engines”, Multi Agency Coordination Committee for Combustion Research (MACCCR) Fuels Research Review, Gaithersburg, MD, September 2008.

78. “Energy Solutions for a Fossil Fuel Deprived Future”, *Opening Plenary Lecture*, Schlinger Symposium, Chemical Heritage Foundation, Philadelphia, PA, September 2008.

79. “Energy Solutions for a Fossil Fuel Deprived Future”, *W. R. Marshall Founders’ Lecture*, Department of Chemical and Biological Engineering, University of Wisconsin, Madison, WI, September 2008.

80. “Energy Solutions for a Future Solar Economy” *Tis Lahiri Lecture*, Chemical and Biomolecular Engineering, Vanderbilt University, Nashville, TN, October 2008.

81. “Energy Solutions for a Fossil Fuel Deprived Future”, National Science Foundation, Arlington, VA, October 2008.

82. “Synergistic Processes to Produce Biofuels from Biomass”, C. Murthy Memorial Lecture, Indian Institute of Chemical Engineers, Chandigarh, India, Dec. 2008.

83. “Synergistic Processes to Produce Biofuels from Biomass”, Indian Institute of Petroleum, Dehradun, India, January 2009.

84. “Energy Solutions for a Fossil Fuel Deprived Future”, Andlinger Energy Lecture, Princeton University, Princeton, February, 2009.

85. “Transportation Fuel in a Fossil Fuel Free world”, Renewable Energy World 2009, Las Vegas, March 2009.

86. “Sustainable Energy Utilization and Transformation”, George W. Woodruff School of Mechanical Engineering’s Sustainable Energy Pathways and Solutions Workshop, Georgia Tech., Atlanta, April 2009.

87. “Synergistic Processes for Biofuels”, Purdue Biofuels Symposium, West Lafayette, In, May 2009.

88. “Transportation Fuel in a Solar Economy”, Keynote Lecture, FOCAPD, Breckenridge, Co, June 2009.

89. “Synergistic Processes for Biofuels”, Plenary Lunch Lecture, BioFuels Conference- The Next Generation of Biofuels, Mississippi State University, Jackson, Ms, August 2009.

90. “Energy Saving Opportunities in Distillation: Identification of Useful Configurations”, Keynote Lecture, 10th International Symposium on Process Systems Engineering, PSE 2009, Salvador, Bahia, Brazil, August 2009.

91. “Energy Solutions for a Fossil Fuel Deprived Future”, Pioneers in Energy Lecture, Purdue University, West Lafayette, IN, September 2009.

92. “Thin Film Solar Cells from Nanocrystal Inks of Quaternary Semiconductors”, GE Global Research, Niskayuna, NY, September 2009.

93. “Thin Film Solar Cells from Nanocrystal Inks of Quaternary Semiconductors”, Solar Workshop at CNM Users Meeting, Argonne National Laboratory, Chicago, IL, October 2009.

94. “More Liquid Fuel from Biomass”, Indo-US Workshop on Climate and Energy Futures, Chennai, India, October 2009.

95. “Transportation Fuel Solutions Using Renewable Energy”, RTI Fellows Symposium, RTI International, Research Triangle Park, NC, November 2009.

96. “A Future Solar Economy”, Invited Session Honoring Professor James Wei, AIChE Annual Meeting, Nashville, TN, November 2009.

97. “Solar Based Sustainable Energy Solutions”, Maddox Solar Energy Series, Whitacre College of Engineering at Texas Tech University, Lubbock, Tx, February, 2010.

98. “Role of Biomass to Liquid Fuel in a Solar Economy”, C3Bio Meeting. Purdue University, West Lafayette, IN, May, 2010.

99. “Solar Based Sustainable Energy Solutions”, Plenary Lecture, 2nd International Symposium on Sustainable Chemical Product and Process Design (ISSCPPE), Hangzhou, China, May, 2010

100. “Energy Savings in Distillation via Identification of Useful Configurations”, V.H. Shah and R. Agrawal (given by VHS), A keynote lecture at Process Development Symposium (PDS), June 2010, Lake Ozark, MO

101. “Transportation Fuel Solutions using Renewable Energy”, EPFL, Lausanne, Switzerland. Sept 2010

102. “Energy Saving Opportunities in Multicomponent Distillation: Optimum Configuration and Thermal Coupling between Distillation Columns”, EPFL, Lausanne, Switzerland. Sept 2010

103. “Chemical Engineering in a Solar Energy Driven Sustainable Future”, PPG Foundation Keynote Address, 32nd Annual Chemical Engineering Graduate Student Association Symposium, Carnegie Mellon University, Pittsburgh, PA, October, 2010

104. “Solar Based Sustainable Energy Solutions”, Pirkey Lecture, University of Texas, Austin, Tx, Nov. 2010

105. “Solar Based Sustainable Energy Solutions”, Invited keynote address, AIChE annual meeting, Salt Lake City, UT, Nov 2010.

106. “Energy Savings in Distillation via Identification of Useful Configurations”, Invited talk in the Gerhold Award Plenary Session on Separations, AIChE Annual Meeting, Salt Lake City, UT, Nov. 2010

107. “Stan Sandler – A perfect Advisor and a Great Mentor”, Invited talk in the Seventieth Birthday Session for Stan Sandler, AIChE Annual Meeting, Salt Lake City, UT, Nov 2010.

108. “Thin Film Solar Cells from Nanocrystal Inks of Quaternary Semiconductors”, Helmholtz-Zentrum Berlin für Materialien und Energie, Berlin Nov. 2010

109. “Transportation Fuel Solutions Using Solar Energy” Helmholtz-Zentrum Berlin für Materialien und Energie, Berlin Feb. 2011

110. “Synthesis of Multicomponent Distillation Configurations and Solar Cells from Nanocrystal Inks of Quaternary Semiconductors”, IIT Kanpur, India, March 2011

111. “Chemical Engineering in a Solar Energy Driven Sustainable Future”, IIT Kanpur, March 2011

112. “Chemical Engineering in a Solar Energy Driven Sustainable Future”, Hugh M. Hulburt Memorial Lecture, Northwestern University, Evanston, IL, April, 2011

113. “Thin Film Solar Cells From Nanocrystal Inks of Quaternary Semiconductors”, Institute of Energy Conversion, University of Delaware, Newark, DE, May 2011

114. “Thin Film Solar Cells From Nanocrystal Inks of Quaternary Semiconductors”, DuPont Experimental Station, Wilmington, DE, May 2011

115. “Energy Savings in Distillation via Identification of Useful Configurations”, Technical Meeting of the European Federation of Chemical Engineering (EFCE) working party on Fluid Separations, Keble College, Oxford University, Oxford, UK, May 2011

116. “Chemical Engineering in a Solar Energy Driven Sustainable Future”, Hess Lecture, Department of Chemical Engineering, University of Virginia, October 2011

117. “Novel Pathways for Biomass-to-Liquid Fuel Production”, In session honoring Professor Santosh K. Gupta, AIChE annual meeting, Minneapolis, October 2011.

118. “ Chemical Engineering Innovation Needs for a Future Solar Economy”, Plenary Lecture, 61st Canadian Chemical Engineering Conference, London, Ontario, Canada, October 2011

119. “Novel Pathways for Biomass-to-Liquid Fuel Production”, Plenary Lecture, 6th Sino/US joint conference, Beijing, China, Nov. 2011

120. “Thin Film Solar Cells from Nanocrystal Inks of Quaternary Semiconductors”, Keynote Lecture, 6th Sino/US joint conference, Beijing, China, Nov. 2011

121. “Energy Savings in Distillation via Identification of Useful Configurations”, Plenary Lecture, 6th Sino/US joint conference, Beijing, China, Nov. 2011

122. “ Chemical Engineering Innovation Needs for a Future Solar Economy”, National University of Singapore, Singapore, December 2011

123. “Thin Film Solar Cells from Nanocrystal Inks of Quaternary Semiconductors”, National University of Singapore, Singapore, December 2011

124. “Energy Savings in Distillation via Identification of Useful Configurations”, National University of Singapore, Singapore, December 2011

125. “Synthesis of Quaternary Semiconductor Nanocrystal Inks and Their Use for Fabrication of Solar Cells”, Indo-US Workshop on photovoltaic science and technologies, IIT Bombay, India, January 2012

126. “Chemical Engineering in a Solar Driven Sustainable Future”, Ken Nobe Founders Lecture in Chemical and Biomolecular Engineering, UCLA, February 2012

127. “A Systems Approach for The Use of Renewable Energy in Transportation”, Pugwash, Purdue University, Feb. 2012

128. “Chemical Engineering in a Solar Driven Sustainable Future”, Truth and Beauty Seminar Series, School of Chemical Engineering, Purdue University, March 2012

129. “Solar Economy- Is It feasible”, Indiana Academy of Science, West Lafayette, IN. March 2012.

130. “How Feasible is Renewable Energy”, Callout Night Speaker, PugWash, Purdue University, August, 2012

131. “Thin Film Solar Cells from Nanocrystal Inks of Quaternary Chalcogenides”, AVS Materials for Energy Meeting, University of Illinois at Urbana-Champaign, September,2012

132. “Chemical Engineering in a Solar Energy Driven Sustainable Future”, Department of Chemical Engineering, University of Pennsylvania, Sept., 2012

133. “Thin Film Solar Cells from Nanocrystal Inks of Quaternary Chalcogenides”, Brookhaven National Lab, September, 2012

134. “Thin Film Solar Cells from Nanocrystal Inks of Quaternary Chalcogenides”, Chemistry Department, University of Chicago, October 2012

135. “Thin Film Solar Cells from Nanocrystals of Quaternary Semiconductors”, Joint symposium of Korean Institute of Chemical Engineering (KIChE) and AIChE to celebrate 50th anniversary of KIChE, AIChE Annual Meeting, Pittsburgh, October 2012.

136. “Sustainable Energy Research in Chemical Engineering”, Joint US-India Symposium, AIChE Annual Meeting, Pittsburgh, October 2012.

137. “Nanocrystal Ink based route for $Cu(In,Ga)Se_2$ and Cu_2ZnSnS_4 Based Efficient Solar Cells”, National University of Singapore, Singapore, December 2012.

138. “Thin Film Solar Cells from Nanocrystal Inks of Quaternary Chalcogenides”, Plenary talk, 7th Singapore International Chemistry Conference (SICC-7), Singapore, December 2012.

139. “Energy Systems Analysis”, Carbon Capture and Utilization Roadmap Agency of Singapore, Singapore, Dec. 2012.

140. “Novel Energy Efficient Distillation Configurations for Sustainable Era”, Padmavibhushan Professor M. M. Sharma Lecture, Indian Institute of Chemical Engineers, Jallandhar, India, Dec. 2012.

141. “Direct Production of Molecules in the Fuel Range by Selective Tailoring of Biomass Fast” Indian Institute of Petroleum, Dehradun, January 2013.

142. “Thin Film Solar Cells from Nanocrystal Inks of Quaternary Chalcogenides”, Indian Institute of Petroleum, Dehradun, January 2013.

143. “Thin Film Solar Cells from Nanoparticle Inks of Quaternary Chalcogenides”, Inaugural lecture in the Photovoltaic Lecture series of the Birck Nanotechnology Center, Purdue University, January, 2013.

144. “CZTS and CZTGeS Solar Cells from Nanocrystal Inks”, IBM/NREL CZTS meeting at IBM’S Watson Research Center, Yorktown Heights, NY, Jan. 2013.

145. “Sustainable Energy Research in Chemical Engineering”, Arizona State University, Phoenix, AZ, Feb. 2013.

146. “Thin Film Solar Cells from Nanocrystal Inks of Quaternary Chalcogenides”, Keynote Lecture, Colombia-US Workshop on Nanotechnology in Energy and Medical Applications, Medellin, Colombia, March 2013.

147. “Solar Cells from Nanocrystal Inks of Quaternary Chalcogenides”, Keynote Lecture, Renewable Energy & Energy Efficiency Workshop, Louisville, March 2013.

148. “Limiting Efficiencies for Solar Thermal Conversion to Fuels”, Keynote Lecture in Session Solar Energy and Solar Fuels, ACS Meeting, April, 2013.

149. “Solar Economy - Is it Feasible?”, Plenary Lecture, Purdue-Mexico Workshop on Sustainability, Purdue University, April, 2013.

150. “Nanocrystal Ink based route for Thin Film Solar Cells of Quaternary Chalcogenides”, Plenary Lecture, International Conference on Energy and Sustainability, Hangzhou, China, May 2013.

151. “A Sustainable Future”, Energy Academy, Purdue University, June 2013.

152. “A Sustainable Future”, SURF Seminar Series, Purdue University, July 2013.

153. “Nanocrystal Ink Based Route for Thin Film Solar Cells of Quaternary Chalcogenides”, Keynote lecture, 3rd International Congress on Sustainability Science and Engineering (ICOSSE'13), Cincinnati, August 2013.

154. “Nanocrystal Ink Based Route For Quaternary Chalcogenides Solar Cells”, Invited opening lecture, The 16th International Conference on II-VI Compound and Related Materials (II-VI 2013), Nagahama, Japan, September, 2013.

155. “Chemical Engineering for a Sustainable Energy Future”, Chemical Engineering, University of Michigan, Ann Arbor, September 2013

156. “Process Engineering in Renewable Energy”, Conference Plenary Lecture, XIV Congrés SFGP 2013, Lyon, France, October 2013

157. “Energy Efficiency Improvement and Process Intensification for Multicomponent Distillation”, DuPont Engineering, E. I. du Pont de Nemours and Company, Wilmington, DE, October 2013

158. “Engineering a Sustainable Energy Future”, Allan P. Colburn Honorary Lecture, DuPont Experimental Station, E. I. du Pont de Nemours and Company, Wilmington, DE, October 2013

159. “Nanoparticle Ink based route for Efficient Thin Film Solar Cells”, The 3_{rd} Annual KAIST CBE Global Distinguished Lecture, Department of Chemical and Biomolecular Engineering, KAIST, Daejeon, Korea, Nov. 2013

160. “Engineering a Sustainable Energy Future”, The 3rd Annual KAIST CBE Global Distinguished Lecture, Department of Chemical and Biomolecular Engineering, KAIST, Daejeon, Korea, Nov. 2013

161. “Energy Efficiency Improvement and Process Intensification for Multicomponent Distillation”, ExxonMobil, Clinton, NJ, Nov. 2013

162. “Engineering a Sustainable Energy Future”, School of Chemical Engineering, Purdue University, West Lafayette, IN, Nov. 2013

163. “Nanoparticle Ink based route for Efficient Thin Film Solar Cells”, CHEMCON, Indian Institute of Chemical Engineers, Mumbai, India, Dec. 2013.