November 2021

BIOGRAPHICAL DATA

JAMES ANTHONY RITTER
L. M. Weisiger Professor of Engineering
Carolina Distinguished Professor

CURRENT PROFESSIONAL INTERESTS

Cyclic Adsorption Processes for Gas Separation and Purification
Developmental and Commercial Adsorbents for Adsorptive Separation and Purification
Characterization Techniques for Equilibrium and Transport Measurements
Magnetic Field-Enhanced Processes for Targeted Drug Delivery and Separations

EDUCATION

Ph.D., Chemical Engineering, State University of New York at Buffalo, 1989
M.S., Chemical Engineering, State University of New York at Buffalo, 1985
B.S., Chemical Engineering, State University of New York at Buffalo, 1983
A.A., Mathematics/Science, Onondaga Community College, 1980

EXPERIENCE

Educational

Carolina Distinguished Professor, University of South Carolina, Department of Chemical Engineering, Columbia, SC, February 2013 to present.
L. M. Weisiger Professor of Engineering, University of South Carolina, Department of Chemical Engineering, Columbia, SC, August 2009 to present.
Graduate Director, University of South Carolina, Department of Chemical Engineering, Columbia, SC, August 2007 to December 2015.
Professor, University of South Carolina, Department of Chemical Engineering, Columbia, SC, August 2003 to present.
Associate Professor, University of South Carolina, Department of Chemical Engineering, Columbia, SC, August 1999 to July 2003.
Assistant Professor, University of South Carolina, Department of Chemical Engineering, Columbia, SC, August 1993 to July 1999.
Associated Faculty, University of South Carolina, School of the Environment, Columbia, SC, October 1995 to present.
Faculty Member, Consortium of the Niagara Frontier, Correctional Facility College Degree Program, Amherst, NY, January 1986 to September 1989.
Research Assistant, SUNY Buffalo, Chemical Engineering Department, Buffalo, NY, July 1983 to September 1989.
Teaching Assistant, SUNY Buffalo, Chemical Engineering Department, Buffalo, NY, September 1983 to June 1986.
Teaching Assistant, Onondaga Community College, Mathematics Department, Syracuse, NY, January 1980 to June 1980.

Industrial

Senior Engineer, Westinghouse Savannah River Company, Savannah River Technology Center, Aiken, SC, October 1989 to August 1993.

Consultant

Current Long-Term:
Covington & Burling LLP, May 2020 to present.
ColdStream, March 2020 to present.
LitXpert, March 2018 to present.
Ingevity Corp., June 2018 to present.
Gore, January 2015 to present.
INGENCO, April 2011 to present.

Past Long-Term:
NASA/MSFC, September 2012 to December 2020.
BP-Amoco Chemical Company, August 2015 to December 2019.
Apache, September 2013 to December 2019.
Praxair, July 2015 to December 2016.
Shell, May 2014 to December 2017.
Nalco, September 2014 to December 2015.
Atlas Copco, December 2013 to November 2014.
Westinghouse Electric Co., August 2011 to July 2013.
ADA Carbon Solutions, May 2011 to July 2012.
Faegre and Benson, February 2005 to December 2010.
Studsvik Development, Inc., January 2008 to 2010.
Chart SeQual Technologies, Inc., January 2007 to March 2013.
Department of Energy, September 2004 to 2006.
IdaTech LLC., January 2003 to December 2003.
BASF Corporation, January 2003 to December 2003
Metalox International, March 2003 to April 2003.
Material Methods, Inc., March 2002 to December 2002.
Munters, August 2000 to December 2001.
Gore Associates, October 2000 to December 2001.
Idaho National Engineering and Environmental Laboratory, ID, January 1998 to December 1999.
3V Inc., October 1999 to March 2000.
Wix, Corp., June 1914 to July 1997.
Exxon Research and Engineering Company, NJ, December 1996 to October 2006.
MeadWestvaco Charleston Research Center, SC, March 1995 to December 2005.

Past Short-Term:
DOE/NETL, October, 2020.
Earthly Labs, September 2016.
SRNL, August 2016.
Air Liquide, April 2013.
Corning, June 2011.

SeQual Technologies, Inc., April 2006.
Praxair Inc, January 2006.
Air Products and Chemicals Inc., July 2004.
PlugPower Inc., May 2004.
General Electric, April 2004.
Questair Inc., January 2003.
Kryotech Inc. October 2000.
BOC Group Inc., August 1997.

SOCIETY MEMBERSHIPS

American Institute of Chemical Engineers
American Chemical Society
American Association for the Advancement of Science
International Adsorption Society
Tau Beta Pi
Sigma Xi
Order of the Engineer

PUBLICATIONS

Refereed Journal Articles

1. J. A. Ritter and R. T. Yang, "Equilibrium Adsorption of Multicomponent Gas Mixtures at Elevated Pressures," *Ind. Eng. Chem. Res.*, 26, 1679-1686, (1987).
2. J. A. Ritter and R. T. Yang, "Thermodynamic Analysis for Rapid Measurements of Equilibrium Adsorption from Binary Gas Mixtures," *Ind. Eng. Chem. Res.*, 28, 599-608 (1989).
3. A. Kapoor, J. A. Ritter and R. T. Yang, "On the Dubinin-Radushkevich Equation for Adsorption in Microporous Solids in the Henry's Law Region," *Langmuir*, 5, 1118-1121 (1989).
4. A. Kapoor, J. A. Ritter and R. T. Yang, "An Extended Langmuir Model for Adsorption of Gas Mixtures on Heterogeneous Surfaces," *Langmuir*, 6, 660-664 (1990).
5. J. A. Ritter, A. Kapoor and R. T. Yang, "Localized Adsorption with Lateral Interaction on Random and Patchwise Heterogeneous Surfaces," *J. Phys. Chem.*, 94, 6785-6791 (1990).
6. Y. D. Chen, J. A. Ritter and R. T. Yang, "Nonideal Adsorption from Multicomponent Gas Mixtures at Elevated Pressures on a 5A Molecular Sieve," *Chem. Eng. Sci.*, 45, 2877-2894 (1990).
7. J. A. Ritter and R. T. Yang, "Equilibrium Theory for Hysteresis Dependent Fixed Bed Desorption," *Chem. Eng. Sci.*, 46, 563-574 (1990).
8. J. A. Ritter and R. T. Yang, "Pressure Swing Adsorption: Experimental and Theoretical Study on Air Purification and Vapor Recovery," *Ind. Eng. Chem. Res.*, 30, 1023-1032 (1991).
9. J. A. Ritter and R. T. Yang, "Air Purification and Vapor Recovery by Pressure Swing Adsorption: Comparison of Silicalite and Activated Carbon," *Chem. Eng. Commun.*, 108, 289-305 (1991).
10. E. S. Kikkinides, J. A. Ritter and R. T. Yang, "Pressure Swing Adsorption for Simultaneous Purification and Sorbate Recovery," *J. Chin. Inst. Chem. Eng.*, 22, 399-407 (1991).

11. J. A. Ritter and J. P. Bibler, "Removal of Mercury from Waste Water: Large Scale Performance of an Ion Exchange Process," *Wat. Sci. Tech.*, 25, 165-172 (1992).
12. J. A. Ritter, J. R. Zamecnik, N. D. Hutson, M. E. Smith and J. T. Carter, "High-Level Radioactive Waste Vitrification Technology and Its Applicability to Industrial Waste Sludges," *Wat. Sci. Tech.*, 25, 269-271 (1992).
13. J. A. Ritter, J. R. Zamecnik and C. W. Hsu, "Hydrogen Generation During Treatment of Simulated High-Level Radioactive Waste with Formic Acid," *Nuclear Technology*, 104, 330-342 (1993).
14. Y. Liu and J. A. Ritter, "Pressure Swing Adsorption-Solvent Vapor Recovery: Process Dynamics and Parametric Study," *Ind. Eng. Chem. Res.*, 35, 2299-2312 (1996).
15. W. Hsu and J. A. Ritter, "Treatment of Simulated High Level Radioactive Waste with Formic Acid: Bench-Scale Study on Hydrogen Evolution," *Nuclear Technology*, 116, 196-207 (1996).
16. W. Hsu and J. A. Ritter, "Combined Use of Nitric and Formic Acids to Reduce Hydrogen Emissions During Treatment of High Level Radioactive Waste," *Nuclear Technology*, 116, 360-365 (1996).
17. Y. Liu and J. A. Ritter, "Fractional Factorial Design Study of a Pressure Swing Adsorption-Solvent Vapor Recovery Process," *Adsorption*, 3, 151-163 (1997).
18. Y. Liu and J. A. Ritter, "Evaluation of Model Approximations in Simulating Pressure Swing Adsorption-Solvent Vapor Recovery", *Ind. Eng. Chem. Res*., 36, 1767-1778 (1997).
19. C. Lin, J. A. Ritter, and M. A. Amiridis, "Effect of Thermal Treatment on the Nanostructure of SiO_2-Al_2O_3 Xerogels," *J. Non-Crystall. Solids.*, 215, 146-154 (1997).
20. D. Subramanian and J. A. Ritter, "Equilibrium Theory for Solvent Vapor Recovery by Pressure Swing Adsorption: Analytical Solution for Process Performance", *Chem. Eng. Sci.*, 52, 3147-3160 (1997).
21. R. Zhang and J. A. Ritter, "New Approximate Model for Nonlinear Adsorption and Diffusion in a Single Particle," *Chem. Eng. Sci.*, 52, 3161-3172 (1997).
22. A. D. Ebner, J. A. Ritter, and H. J. Ploehn, "Feasibility and Limitations of Nanolevel High Gradient Magnetic Separation", *Separation and Purification Technology*, 11, 199-210 (1997).
23. C. Lin and J. A. Ritter, "Effect of Synthesis pH on the Structure of Carbon Xerogels," *Carbon*, 35, 1271-1278 (1997).
24. J. Skvoretz, S. Ortaldo, J. A. Ritter and J. H. Wong, "Adsorption Characteristics of Carbon Filter Materials," *Advances in Filtration Technology*, 11, 244-251 (1997).
25. Y. Liu and J. A. Ritter, "Periodic State Heat Effects in Pressure Swing Adsorption-Solvent Vapor Recovery," *Adsorption*, 4, 159-172 (1998).
26. S. A. Al-Muhtaseb and J. A. Ritter, "New Virial-Type Model for Predicting Single and Multicomponent Isosteric Heats of Adsorption," *Ind. Eng. Chem. Res*., 37, 684-696 (1998).
27. H. Pan, J. A. Ritter and P. B. Balbuena, "Isosteric Heats of Adsorption on Carbon Predicted by Density Functional Theory," *Ind. Eng. Chem. Res*., 37, 1159-1166 (1998).
28. D. Subramanian and J. A. Ritter, "Equilibrium Theory for Binary Solvent Vapor Recovery by Pressure Swing Adsorption: Conceptual Process Design for Separation of the Lighter Component," *Chem. Eng. Sci.*, 53, 1295-1305 (1998).
29. T. J. Bandosz, C. Lin and J. A. Ritter, "Porosity and Surface Acidity of SiO_2-Al_2O_3 Xerogels," *J. Colloid and Interface Science*, 198, 347-353 (1998).
30. J. A. Ritter, Y. Liu and D. Subramanian, "New Vacuum Swing Adsorption Cycles for Air

Purification with the Feasibility of Complete Clean-Up," *Ind. Eng. Chem. Res*., 37, 1970-1976 (1998).

31. J. A. Ritter and Y. Liu, "Tapered Pressure Swing Adsorption Columns for Simultaneous Air Purification and Solvent Vapor Recovery," *Ind. Eng. Chem. Res*., 37, 2783 (1998).
32. A. D. Ebner, J. A. Ritter and B. N. Popov, "Potentially Enhanced Complexation Model for the Determination of Isopotential Equilibrium Curves," *J. Colloid and Interface Science,* 203(2), 488 (1998).
33. Y. Liu, C. E. Holland and J. A. Ritter, "Pressure Swing Adsorption-Solvent Vapor Recovery-I: Experimental Transient and Periodic Dynamic Behavior of the Butane-Activated Carbon System," *Sep. Sci. Tech*., 33, 2311 (1998).
34. S. A. Al-Muhtaseb and J. A. Ritter. "Further Modification of the Antoine Equation for Correlation of Adsorption Equilibria," *Langmuir*, 14, 5317-5323 (1998).
35. Y. Liu, C. E. Holland and J. A. Ritter, "Pressure Swing Adsorption-Solvent Vapor Recovery-II: Experimental Periodic Performance of the Butane-Activated Carbon System," *Sep. Sci. Tech*., 33, 2431 (1998).
36. Y. Liu, J. Delgado and J. A. Ritter, "Comparison of Finite Difference Techniques for Simulating Pressure Swing Adsorption," *Adsorption*, 4, 337-344 (1998).
37. C. Lin, J. A. Ritter and B. N. Popov, "Characterization of Sol-Gel Derived Cobalt Oxide Xerogels as Electrochemical Capacitors," *J. Electrochemical Society*, 145, 4091-4103 (1998).
38. H. Pan, J. A. Ritter and P. B. Balbuena, "Examination of the Approximations Used in Determining the Isosteric Heat of Adsorption from the Clausius Clapeyron Equation," *Langmuir*, 14, 6323-6327 (1998).
39. J. A. Ritter and S. A. Al-Muhtaseb, "New Model that Describes Adsorption of Laterally Interacting Gas Mixtures on Random Heterogeneous Surfaces: I. Parametric Study and Correlation with Binary Data" *Langmuir*, 14, 6528-6538 (1998).
40. G. G. Botte, R. Zhang and J. A. Ritter," On the Use of Different Parabolic Concentration Profiles for Nonlinear Adsorption and Diffusion in a Single Particle," *Chem. Eng. Sci.*, 53, 4135-4146 (1998).
41. P. Yu, B. N. Popov, J. A. Ritter and R. E. White, "Determination of the Lithium Ion Diffusion Coefficient in Graphite," *J. Electrochemical Society*, 146, 8-14 (1999).
42. D. Subramanian, J. A. Ritter and Y. Liu, "Equilibrium Theory for Solvent Vapor Recovery by Pressure Swing Adsorption: Analytic Solution with Velocity Variation and Gas Phase Capacity," *Chem. Eng. Sci.*, 54, 475-481 (1999).
43. Y. Liu, C. E. Holland and J. A. Ritter, "Pressure Swing Adsorption-Solvent Vapor Recovery-III: Comparison of Simulation with Experiment for the Butane-Activated Carbon System," *Sep. Sci. Tech*., 34, 1545-1576 (1999).
44. A. D. Ebner, J. A. Ritter, H. J. Ploehn, R. L. Kochen and J. D. Navratil "New Magnetic Field Enhanced Process for the Treatment of Aqueous Wastes," *Sep. Sci. Tech*., 34, 1277- 1300 (1999).
45. A. D. Ebner, J. A. Ritter and L. Nunez, "High Gradient Magnetic Separation for the Treatment of High Level Radioactive Wastes," *Sep. Sci. Tech*., 34, 1333-1350 (1999).
46. J. Shen, A. D. Ebner and J. A. Ritter, "Points of Zero Charge and Intrinsic Equilibrium Constants of Silica-Magnetite Composite Oxides," *J. Colloid and Interface Science,* 214, 333-343 (1999).
47. H. Pan, J. A. Ritter and P. B. Balbuena, "Binary Isosteric Heats of Adsorption in Carbon Predicted from Density Functional Theory," *Langmuir*, 15, 4570-4578 (1999).

48. S. A. Al-Muhtaseb and J. A. Ritter. "Roles of Surface Heterogeneity and Lateral Interactions on the Isosteric Heat of Adsorption and Adsorbed Phase Heat Capacity," *J. Phys. Chem. B.,* 13, 2467-2479 (1999).
49. G. G. Botte, R. Zhang and J. A. Ritter, "New Approximate Model for Nonlinear Adsorption and Concentration Dependent Surface Diffusion in a Single Particle," *Adsorption,* 5, 373-380 (1999).
50. C. Lin, J. A. Ritter and B. N. Popov, "Development of Carbon-Metal Oxide Supercapacitors from Sol-Gel Derived Carbon-Ruthenium Xerogels," *J. Electrochemical Society,* 146, 3155-3160 (1999).
51. C. Lin, J. A. Ritter, B. N. Popov and R. E. White, "A Mathematical Model of an Electrochemical Capacitor with Double Layer and Faradaic Processes," *J. Electrochemical Society,* 146, 3168-3175 (1999).
52. C. Lin, J. A. Ritter and B. N. Popov, "Correlation of the Double-Layer Capacitance with the Pore Structure of Sol-Gel Derived Carbon Xerogels," *J. Electrochemical Society,* 146, 3639-3643 (1999).
53. S. A. Al-Muhtaseb and J. A. Ritter, "A Statistical Mechanic Perspective on the Temperature Dependence of the Isosteric Heat of Adsorption and Adsorbed Phase Heat Capacity," *J. Phys. Chem. B.,* 103, 8104-8115 (1999).
54. S. A. Al-Muhtaseb and J. A. Ritter, "New Model that Describes Adsorption of Laterally Interacting Gas Mixtures on Random Heterogeneous Surfaces. 2. Correlation of Complex Binary and Prediction of Multicomponent Adsorption Equilibria," *Langmuir*, 15, 7732-7744 (1999).
55. P. Yu, J. A. Ritter, R. E. White and B. N. Popov, "Ni-Composite Microencapsulated Graphite as the Negative Electrode in Lithium-Ion Batteries I. Initial Irreversible Capacity Study," *J. Electrochemical Society*, 147, 1280-1285 (2000).
56. Y. Liu, J. A. Ritter and B. K. Kaul, "Pressure Swing Adsorption Cycles for Improved Solvent Vapor Enrichment," *AIChE Journal,* 46, 540-551 (2000).
57. C. Lin and J. A. Ritter, "Carbonization and Activation of Sol-Gel Derived Carbon Xerogels," *Carbon,* 38, 849-861 (2000).
58. P. Yu, J. A. Ritter, R. E. White, and B. N. Popov, "Ni-Composite Microencapsulated Graphite as the Negative Electrode in Lithium-Ion Batteries II. Electrochemical Impedance and Self-Discharge Studies," *J. Electrochemical Society,* 147, 2081-2085 (2000).
59. A. D. Ebner, J. A. Ritter, H. J. Ploehn, "Magnetic Hetero-Flocculation of Paramagnetic Colloidal Particles," *J. Colloid and Interface Science,* 225, 39-46 (2000).
60. Y. Liu, J. A. Ritter and B. K. Kaul, "Simulation of Gasoline Vapor Recovery by Pressure Swing Adsorption," *Separation and Purification Technology,* 20, 111-127 (2000).
61. P. Yu, B. S. Haran, J. A. Ritter, R. E. White and B. N. Popov, "Palladium Microencapsulated Graphite as the Negative Electrode in Li-Ion Cells," *J. Power Sources,* 91, 107-117 (2000).
62. G. G. Botte, J. A. Ritter and R. E. White, "Comparison of Finite Difference and Control Volume Methods for Solving Differential Equations," *Computers and Chemical Engineering,* 24, 2633-2654 (2000).
63. S. A. Al-Muhtaseb, M. D. LeVan and J. A. Ritter, "On the Correlation of Modified Antoine's Adsorption Isotherm Models with Experimental Data," *Langmuir,* 16, 8536-8538 (2000).
64. S. A. Al-Muhtaseb, C. E. Holland and J. A. Ritter, "Adsorption of C_1 to C_7 Normal Alkanes on BAX Activated Carbon: 2. Statistically-Optimized Approach for Deriving Thermodynamic Properties from the Adsorption Isotherm", *Ind. Eng. Chem. Res*., 40, 319-337 (2001).

65. C. E. Holland, S. A. Al-Muhtaseb, and J. A. Ritter, "Adsorption of C_1 to C_7 Normal Alkanes on BAX Activated Carbon: 1. Potential Theory Correlation and Adsorbent Characterization," *Ind. Eng. Chem. Res*., 40, 338-346 (2001).
66. A. D. Ebner and J. A. Ritter, "New Correlation for the Capture Cross Section in High Gradient Magnetic Separation," *AIChE Journal*, 47, 303-313 (2001).
67. C. M. Parlor, J. A. Ritter and M. D. Amiridis, "Infrared Spectroscopic Study of Sol-Gel Derived Mixed-Metal Oxides," *J. Non-Cryst. Solids*, 279, 119-125 (2001).
68. A. D. Ebner, J. A. Ritter and J. D. Navratil, "Adsorption of Cesium, Strontium and Cobalt Ions on Magnetite and Magnetite-Silica Composite," *Ind. Eng. Chem. Res.*, 40, 1615-1623 (2001).
69. V. R. Subramanian, J. A. Ritter and R. E. White, "Approximate Solutions for Galvanostatic Discharge of Spherical Particles – 1. Constant Diffusion Coefficient, *J. Electrochemical Society*, 148, E444-E449 (2001).
70. A. M. Puziy, O. I. Poddubnaya, J. A. Ritter, A. D. Ebner and C. E. Holland, "Elucidation of the Ion Binding Mechanism in Heterogeneous Carbon Composite Adsorbents," *Carbon*, 39, 2313-2324 (2001).
71. S. A. Gadre and J. A. Ritter, "New Analytical Solution for Nonlinear Adsorption and Diffusion in a Single Particle, *Chem. Eng. Sci.*, 57, 1197-1204 (2002).
72. E. J. Zanto, S. A. Al-Muhtaseb and J. A. Ritter, "Sol-Gel Derived Carbon Aerogels and Xerogels: Design of Experiments Approach to Materials Synthesis," *Ind. Eng. Chem. Res.*, 41, 3151-3162 (2002).
73. J. A. McIntyre, C. E. Holland and J. A. Ritter, "High Enrichment and Recovery of Dilute Hydrocarbons by Dual Reflux Pressure Swing Adsorption," *Ind. Eng. Chem. Res.*, 41, 3499-3504 (2002).
74. K. D. Daniel and J. A. Ritter, "Equilibrium Theory Analysis of a Pressure Swing Adsorption Cycle Utilizing an Unfavorable Langmuir Isotherm. 1. Periodic Behavior," *Ind. Eng. Chem. Res.*, 41, 3676-3687 (2002).
75. A. D. Ebner and J. A. Ritter, "Equilibrium Theory Analysis of a Rectifying Pressure Swing Adsorption Process for Producing Pure Heavy Component," *AIChE Journal*, 48, 1679-1691 (2002).
76. S. A. Gadre and J. A. Ritter, "New Model for Nonlinear Adsorption and Diffusion Based on a Quartic Concentration Profile Approximation," *Ind. Eng. Chem. Res.*, 41, 4353-4361 (2002).
77. A. D. Ebner and J. A. Ritter, Concentrating Dilute Sludge Wastes with High Gradient Magnetic Separation: Breakthrough Experiments and Performance, *Ind. Eng. Chem. Res.*, 41, 5049-5057 (2002).
78. A. D. Ebner, J. A. Ritter, and H. J. Ploehn, "Magnetic Field Orientation and Spatial Effects on the Retention of Paramagnetic Nanoparticles with Magnetite," *Sep. Sci. Tech.*, 37, 3727-3753 (2002).
79. S. A. Al-Muhtaseb and J. A. Ritter, "Preparation and Properties of Resorcinol-Formaldehyde Organic and Carbon Gels," *Advanced Materials*, 15, 101-114 (2003).
80. S. A. Gadre, A. D. Ebner, S. A. Al-Muhtaseb and J. A. Ritter, "Practical Modeling of Metal Hydride Hydrogen Storage Systems," *Ind. Eng. Chem. Res.*, 42, 1713-1722 (2003).
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82. K. D. Daniel and J. A. Ritter, "Equilibrium Theory Analysis of a Pressure Swing Adsorption

Cycle Utilizing an Unfavorable Langmuir Isotherm. 2. Approach to Periodic Behavior," *Ind. Eng. Chem. Res.*, 42, 3381-3390 (2003).

83. C. Lin, S. A. Al-Muhtaseb and J. A. Ritter, "Thermal Treatment of Sol-Gel Derived Nickel Oxide Xerogels," *J. Sol-Gel Science and Technology*, 28, 133-141 (2003).
84. J. A. Ritter, A. D. Ebner, J. Wang and R. Zidan, "Implementing a Hydrogen Economy," *Materials Today*, September, 18-23 (2003).
85. J. A. Ritter, A. D. Ebner, K. D. Daniel, and K. L. Stewart, "Application of High Gradient Magnetic Separation Principles to Magnetic Drug Targeting," *J. Magnetism and Magnetic Materials*, 280, 184-201 (2004).
86. A. D. Ebner and J. A. Ritter, "Retention of Paramagnetic Particles by Magnetite Particle Clusters with Multifunctional Character," *Sep. Sci. Tech.*, 39, 2785-2808 (2004).
87. A. D. Ebner and J. A. Ritter, "Retention of Iron Oxide Particles by Stainless Steel and Magnetite Magnetic Matrix Elements in High Gradient Magnetic Separation," *Sep. Sci. Tech.*, 39, 2865-2892 (2004).
88. A. D. Ebner and J. A. Ritter, "Equilibrium Theory Analysis of Dual Reflux PSA for Separation of a Binary Mixture," *AIChE Journal*, 50, 2418-2429 (2004).
89. S. A. Al-Muhtaseb and J. A. Ritter, "New Methodology for the Measurement and Analysis of Adsorption Dynamics: Butane on Activated Carbon," *Ind. Eng. Chem. Res.*, 43, 7075-7082 (2004).
90. H. Chen, A. D. Ebner, A. J. Rosengart, M. D. Kaminski, and J. A. Ritter, "Analysis of Magnetic Drug Carrier Particle Capture by a Magnetizable Intravascular Stent. Part 1: Parametric Study with Single Wire Correlation," *J. Magnetism and Magnetic Materials*, 284, 181-194 (2004).
91. S. P. Reynolds, A. D. Ebner and J. A. Ritter, New Pressure Swing Adsorption Cycles for Carbon Dioxide Sequestration," *Adsorption*, 11, 531-536 (2005).
92. J. Wang, A. D. Ebner and J. A. Ritter, "On the Reversibility of Hydrogen Storage in Novel Complex Hydrides," *Adsorption*, 11, 811-816 (2005).
93. S. A. Gadre, A. D. Ebner and J. A. Ritter, "Two Dimensional Model for the Design of Metal Hydride Hydrogen Storage Systems," *Adsorption*, 11, 871-876 (2005).
94. J. Wang, A. D. Ebner, R. Zidan, and J. A. Ritter, "Synergistic Effects of Co-Dopants on the Dehydrogenation Kinetics of Sodium Aluminum Hydride," *J. Alloys and Compounds*, 391, 245-255 (2005).
95. Z. Jiang, R. A. Dougal, S. Liu, S. A. Gadre, A. D. Ebner and J. A. Ritter, "Simulation of a Thermally-Coupled Metal Hydride Hydrogen Storage and Fuel Cell System," *J. Power Sources*, 142, 92-102 (2005).
96. J. Wang, A. D. Ebner, T. Prozorov, R. Zidan, and J. A. Ritter, "Effect of Graphite on the Dehydrogenation and Hydrogenation Kinetics of Ti-Doped Sodium Aluminum Hydride," *J. Alloys and Compounds*, 395, 252-262 (2005).
97. M. O. Aviles, A. D. Ebner, H. Chen, A. J. Rosengart, M. D. Kaminski, and J. A. Ritter, "Theoretical Analysis of a Transdermal Ferromagnetic Implant for Retention of Magnetic Drug Carrier Particles," *J. Magnetism and Magnetic Materials*, 293, 605-615 (2005).
98. A. J. Rosengart, M. D. Kaminski, H. Chen, P. L. Caviness, A. D. Ebner and J. A. Ritter, "Magnetizable Intraluminal Stent and Functionalized Magnetic Carriers: A Novel Approach for Non-Invasive Yet Targeted Drug Delivery," *J. Magnetism and Magnetic Materials*, 293, 633-638 (2005).
99. H. Chen, A. D. Ebner, A. J. Rosengart, M. D. Kaminski, and J. A. Ritter, "Analysis of Magnetic Drug Carrier Particle Capture by a Magnetizable Intravascular Stent. Part 2: Parametric

Study with Multi-Wire Two-Dimensional Model," *J. Magnetism and Magnetic Materials*, 293, 616-632 (2005).

100. S. A. Gadre, A. D. Ebner, and J. A. Ritter, "Further Validation of the Quartic Concentration Profile Approximation for Describing Intraparticle Transport in Cyclic Adsorption Systems," *Adsorption*, 11, 295-312 (2005).
101. S. P. Reynolds, A. D. Ebner, and J. A. Ritter, "Novel Enriching PVSA Cycle for the Production of Nitrogen from Air," *Ind. Eng. Chem. Res.*, 45, 3256-3264 (2006).
102. J. Wang, A. D. Ebner and J. A. Ritter, "Physiochemical Pathway for Cyclic Dehydrogenation and Rehydrogenation of $LiAlH_4$," *J. American Chemical Soc.*, 128, 5949-5954 (2006).
103. S. P. Reynolds, A. D. Ebner, and J. A. Ritter, "Stripping PSA Cycles for CO_2 Recovery from Flue Gas at High Temperature Using a Hydrotalcite-Like Adsorbent," *Ind. Eng. Chem. Res.*, 45, 4278-4294 (2006).
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105. A. D. Ebner, S. P. Reynolds and J. A. Ritter, "Understanding the Adsorption and Desorption Behavior of CO_2 on a K-Promoted HTlc through Non-Equilibrium Dynamic Isotherms," *Ind. Eng. Chem. Res.*, 45, 6387-6392 (2006).
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Capacitors II, Vol. 98-15, (W. R. Cieslak, ed.), The Electrochemical Society Proceedings Series, NJ (1999).

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20. A. D. Ebner and J. A. Ritter, "Theoretical Correlation for the Capture Cross Section in High Gradient Magnetic Separation," in *Fourth Topical Conference of Separations Science and Technology*," American Institute of Chemical Engineers, NY (1999).
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23. P. Yu, B. S. Haran, J. A. Ritter, R. E. White and B. N. Popov, "Palladium-Microencapsulated Graphite as the Negative Electrode for Lithium-Ion Cells," *The Electrochemical Society Proceedings Series, Vol. 99-25*, 800-809 (2000).
24. J. A. Ritter and S. A. Al-Muhtaseb, "Adsorption Process Modeling: State of the Art," in *AIChE Separations Technology Topical Conference*, (P. Bryan and A. Serbezov, eds.), American Institute of Chemical Engineers, NY (2001).
25. K. D. Daniel and J. A. Ritter, "Equilibrium Theory Analysis of the Approach to the Periodic State in a Pressure Swing Adsorption Cycle Utilizing an Unfavorable Langmuir Isotherm," in *AIChE Separations Technology Topical Conference*, (P. Bryan and A. Serbezov, eds.), American Institute of Chemical Engineers, NY (2001).
26. R. A. Riggleman, A. D. Ebner, J. A. Ritter and R. Zidan, "On the Development of Novel Adsorbent Materials for Hydrogen Storage Systems," in *AIChE Separations Technology Topical Conference*, (P. Bryan and A. Serbezov, eds.), American Institute of Chemical Engineers, NY (2001).
27. A. D. Ebner and J. A. Ritter, "Equilibrium Theory Analysis of a Rectifying Pressure Swing Adsorption Process for Producing Pure Heavy Component," in *AIChE Separations Technology Topical Conference*, (P. Bryan and A. Serbezov, eds.), American Institute of Chemical Engineers, NY (2001).
28. S. A. Gadre, K. D. Daniel, A. D. Ebner, S. A. Al-Muhtaseb and J. A. Ritter, "Simple and Complex Models for the Design of H_2 Storage Systems," in *AIChE Separations Technology Topical Conference*, (P. Bryan and A. Serbezov, eds.), American Institute of Chemical Engineers, NY (2001).
29. S. A. Al-Muhtaseb, K. D. Daniel, J. A. Mc Intyre and J. A. Ritter, "Nonisothermal Adsorption Dynamics and its Role in the Modeling of PSA-Solvent Vapor Recovery Processes," in *AIChE Separations Technology Topical Conference*, (P. Bryan and A. Serbezov, eds.), American Institute of Chemical Engineers, NY (2001).
30. S. P Reynolds, A. D. Ebner, J. A. Ritter, J. C. Knox and L. D. LeVan, "Mathematical Simulation of the Sorbent-Based Atmosphere Revitalization System for the Crew Exploration Vehicle," in *Proceedings of the 36th International Conference on Environmental Systems*, SAE Aerospace (2006).
31. J. A. Ritter, S. P Reynolds, A. D. Ebner, J. C. Knox and M. D. LeVan, "Design and Performance of the Sorbent-Based Atmosphere Revitalization System for Orion," in

Proceedings of the 37th International Conference on Environmental Systems, SAE Aerospace (2007).

32. A. D. Ebner, J. A. Ritter, M. D. LeVan and J. C. Knox, "Unique Regeneration Steps for the Sorbent-Based Atmosphere Revitalization System Designed for CO_2 and H_2O Removal from Spacecraft Cabins," in *Proceedings of the 39th International Conference on Environmental Systems*, SAE Aerospace (2009).

Guest Editorships

1. J. A. Ritter, A. D. Ebner, and J. D. Navratil, eds. "Magnetic-Field Enhanced Separations," special issue of *Separation Science and Technology*, 37 (2002).
2. J. A. Ritter and B. K. Kaul, eds. "Special Issue Honoring Professor Douglas M. Ruthven, AIChE Annual Meeting 2000," *Adsorption*, **9** (2003).
3. J. A. Ritter, A. D. Ebner, and J. D. Navratil, eds. "Magnetic-Field Enhanced Separations," special issue of *Separation Science and Technology*, 39 (2004).

TECHNICAL MEETING PRESENTATIONS

304. A. D. Ebner, C. E. Holland, O. A. Smithson and J. A. Ritter, "New 100 Hz Volumetric Frequency Response System: Design, Operation and Analysis," Virtual AIChE Annual Meeting, San Francisco, CA, November, 2020, contributed.
303. A. D. Ebner and J. A. Ritter, "On the Use of the Absolute, Excess and Net Amounts Adsorbed in Dynamic Mass Balances," Virtual AIChE Annual Meeting, San Francisco, CA, November, 2020, invited.
302. S. A. Adegunju, R. T. Sanders, C. E. Holland, A. D. Ebner, J. A. Ritter, G. S. Foo, R. P. Grasso, S. K. Stark, J. R. Hanrahan and J. W. Henderson, "New Carbon and Zeolite Structured Adsorbents Made from Expanded PTFE," Virtual AIChE Annual Meeting, San Francisco, CA, November, 2020, contributed.
301. S. Tosso, B. F. Kisomi, A. D. Ebner and J. A. Ritter, "Single Gas Multi-Normal Energy Distribution Models for Predicting Mixed Gas Adsorption Equilibria from Non-Uniform Heterogeneous Extended Langmuir and HIAS Models," Virtual AIChE Annual Meeting, San Francisco, CA, November, 2020, contributed.
300. B. F. Kisomi, A. D. Ebner and J. A. Ritter, "Multi-Normal Energy Distribution Model for Correlating Single Gas Adsorption Isotherms for Carbon Dioxide, Methane, Ethane, Ethylene, Propane and Propylene on 5A Zeolite," Virtual AIChE Annual Meeting, San Francisco, CA, November, 2020, contributed.
299. P. B. C. A. Amalraj, M. A. Nicholson, A. D. Ebner and J. A. Ritter, "Design and Scale-Up of TVSA Cycle for CO_2 Removal from Spacecraft Cabins Using a Structured Adsorbent," Virtual AIChE Annual Meeting, San Francisco, CA, November, 2020, contributed.
298. H. Jiang, A. D. Ebner and J. A. Ritter, "Process Scaling and Design for Large Scale CO_2 Capture by PSA," Virtual AIChE Annual Meeting, San Francisco, CA, November, 2020, contributed.
297. H. Jiang, A. D. Ebner and J. A. Ritter, "Incorporating a Vacuum Pump Performance Curve in Cyclic Adsorption Process Simulation," AIChE Annual Meeting, Orlando, FL, November, 2019, contributed.
296. A. D. Ebner, P. B.C.A. Amalraj, R. T Sanders and J. A. Ritter, "On the Use of Structured Adsorbents in PTSA Cycles for CO_2 Removal from Spacecraft Cabins," AIChE Annual

Meeting, Orlando, FL, November, 2019, contributed.

295. B. F. Kisomi, A. D. Ebner and J. A. Ritter, "Equilibrium Theory Analysis of Equalization Tanks in a PSA Process," AIChE Annual Meeting, Orlando, FL, November, 2019, contributed.
294. J. A. Ritter, K. J. Tynan and A. D. Ebner, "On the Use of Single, Dual and Three Process Langmuir Models for Gas Mixture Components that Exhibit Different Combinations of these Processes," AIChE Annual Meeting, Orlando, FL, November, 2019, contributed.
293. P. B. C. A. Amalraj, A. D. Ebner and J. A. Ritter, "Exploiting Structured Bed Thermal Conductivity for Enhancing the Performance of Temperature Swing Adsorption Processes," AIChE Annual Meeting, Orlando, FL, November, 2019, contributed.
292. P. B. C. A. Amalraj, A. D. Ebner and J. A. Ritter, "Role of Bed Design Characteristics on the Effective Thermal Conductivity of a Structured Adsorbent," AIChE Annual Meeting, Pittsburgh, PA, November, 2018, contributed.
291. A. D. Ebner, R. T. Sanders, J. C. Knox and J. A. Ritter, "Structured Adsorbent PTSA Cycles for Metabolic CO_2 Removal from Spacecraft Cabins," AIChE Annual Meeting, Pittsburgh, PA, November, 2018, contributed.
290. J. A. Ritter, K. C. Bullmiller, L. Erden and A. D. Ebner, "On the Use of the Dual Process Langmuir Model for Gas Mixture Components that Exhibit Single Process or Linear Isotherms," AIChE Annual Meeting, Pittsburgh, PA, November, 2018, contributed.
289. J. A. Ritter, "Pressure Swing Adsorption: Proving to be a Universal Gas Separation Technology," 42nd International Carbon Conference, Pittsburg," PA, September, 2018, invited.
288. J. A. Ritter and A. D. Ebner, "On the Use of Structured Adsorbents in Pressure and Temperature Swing Adsorption Processes," 8th World Congress on Particle Technology, Orlando, FL, April, 2018, invited *Keynote Speaker*.
287. J. A. Ritter, Challenges in PI & MCPI Education & WFD for Intensified Process Fundamentals, AIChE Spring Meeting, Orlando, FL, April, 2018, invited.
286. M. B. Schmithorst, A. D. Ebner and J. A. Ritter, "Separation of CO_2 and N_2 by Rapid PSA using 13X Zeolite and a Dual Reflux Cycle," AIChE Annual Meeting, Minneapolis, MN, October, 2017, contributed.
285. A. D. Ebner, M. A. Nicholson, P. A. Fairchild and J. A. Ritter, "Thermogravimetric and Breakthrough Studies on the Adsorption Reversibility of SO_2, NO_2 and NO on Type A and X Zeolites," AIChE Annual Meeting, Minneapolis, MN, October, 2017, contributed.
284. J. A. Ritter, A. D. Ebner and J. C. Knox, "Development of a PTSA Process for Metabolic CO_2 Removal from Spacecraft Cabins Using a Structured 13X Adsorbent," AIChE Annual Meeting, Minneapolis, MN, October, 2017, contributed.
283. J. A. Ritter A. D. Ebner, L. Erden and J. Ho, "On the Development of a PSA Process for Natural Gas Purification," AIChE Annual Meeting, Minneapolis, MN, October, 2017, contributed.
282. J. A. Ritter, "Adsorption and Membrane Processes for Low Energy Separations: Past and Present Initiatives," Separations Technology IX: New Frontiers in Media, Techniques, and Technologies, Albufeira, Portugal, March, 2017, invited.
281. J. A. Ritter, A. D. Ebner and N. Mohammadi, "On the Use of Structured Adsorbents in Cyclic Adsorption Processes," Separations Technology IX: New Frontiers in Media, Techniques, and Technologies, Albufeira, Portugal, March, 2017, invited.
280. J. A. Ritter, "Past and Present Pressure Swing Adsorption Technology," AIChE Annual Meeting, San Francisco, CA, November, 2016, invited.

279. J. C. Knox, A. D. Ebner, M. D. LeVan and J. A. Ritter, "On the Limitations of Breakthrough Curve Analysis in Fixed-Bed Adsorption," AIChE Annual Meeting, San Francisco, CA, November, 2016, contributed.
278. J. A. Ritter, A. D. Ebner, M. Natenapit and N. Choomphon-Anomakhun, "Simulation of Dynamic Magnetic Drug Carrier Particle Capture and Accumulation around a Ferromagnetic Wire," AIChE Annual Meeting, San Francisco, CA, November, 2016, contributed.
277. N. Mohammadi, A. D. Ebner, J. A. Ritter and L. Erden, "Carbon Dioxide Capture from Flue Gas by a PSA Process Utilizing a Structured Adsorbent: Full Scale Simulation with Model Validated at the Bench Scale," AIChE Annual Meeting, San Francisco, CA, November, 2016, contributed.
276. M. I. Hossain, A. D. Ebner and J. A. Ritter, "Understanding the Transport of Gases in Carbon Molecular Sieve Using the Volumetric Frequency Response Technique," AIChE Annual Meeting, San Francisco, CA, November, 2016, contributed.
275. H. Erden, A. D. Ebner and J. A. Ritter, "Two-Stage PSA System for CO_2 Removal during Closed-Loop Human Space Exploration Missions," AIChE Annual Meeting, San Francisco, CA, November, 2016, contributed.
274. J. A. Ritter, M. D. Rahman, N. Mohammadi, M. A. Nicholson, L. Erden, C. E. Holland and A. D. Ebner, "On the Use of a Novel Structured Adsorbent for CO_2 Capture from Flue Gas by PSA: Bench Scale Demonstration," Twelfth International Conference on Fundamentals of Adsorption (FOA12), Friedrichshafen, Germany, June, 2016, contributed.
273. M. D. Rahman, A. D. Ebner and J. A. Ritter, "Experimental Validation of High Throughput Separation by Rapid Pressure Swing Adsorption," Twelfth International Conference on Fundamentals of Adsorption (FOA12), Friedrichshafen, Germany, June, 2016, contributed.
272. A. D. Ebner, H. Erden and J. A. Ritter, "New PSA Cycle for Removing and Concentrating Metabolic CO_2 Produced during Closed-Loop Human Space Exploration Missions," Twelfth International Conference on Fundamentals of Adsorption (FOA12), Friedrichshafen, Germany, June, 2016, contributed.
271. A. Rahman, A. D. Ebner, C. E. Holland and J. A. Ritter, "High Throughput Separation by Rapid PSA: Bench Scale Demonstration of Model Binary Gas Mixture," AIChE Annual Meeting, Salt Lake City, UT, November, 2015, contributed.
270. J. A. Ritter, A. Rahman, N. Mohammadi, M. A. Nicholson, L. Erden, C. E. Holland and A. D. Ebner, "CO_2 Capture from Flue Gas by PSA: Bench-Scale Demonstration of a Novel Structured Adsorbent," AIChE Annual Meeting, Salt Lake City, UT, November, 2015, contributed.
269. N. Mohammadi, A. D. Ebner and J. A. Ritter, "CO_2 Capture from Flue Gas By PSA: Comparison of Bench to Full Scale Process Simulation when Utilizing a Structured Adsorbent," AIChE Annual Meeting, Salt Lake City, UT, November, 2015, contributed.
268. H. Erden, A. D. Ebner and J. A. Ritter, "New PSA Cycle for CO_2 Removal During Closed-Loop Human Space Exploration Missions," AIChE Annual Meeting, Salt Lake City, UT, November, 2015, contributed.
267. A. D. Ebner and J. A. Ritter, "Dynamic Adsorption Process Simulator: Evolution of the Energy Balance on the Approach to Periodicity," AIChE Annual Meeting, Salt Lake City, UT, November, 2015, contributed.
266. J. A. Ritter, "Bench-Scale Development and Testing of Rapid PSA for CO_2 Capture," 2015 NETL CO_2 Capture Technology Meeting, Pittsburgh, PA, June, 2015, invited.
265. N. Mohammadi, A. D. Ebner and J. A. Ritter, "Understanding Complex Structured

Adsorbent Contactors Via 3-D CFD Modeling," AIChE Annual Meeting, Atlanta, GA, November, 2014, contributed.

264. J. A. Ritter, M. I. Hossain and A. D. Ebner, "On the Use of Volumetric Frequency Response for Understanding the Transport of Gases in Commercial Adsorbents," AIChE Annual Meeting, Atlanta, GA, November, 2014, contributed.
263. J. A. Ritter, N. Mohammadi, M. A. Nicholson, L. Erden and A. D. Ebner, "Novel Structured Adsorbent and Flowsheet for CO_2 Capture from Flue Gas By PSA," AIChE Annual Meeting, Atlanta, GA, November, 2014, contributed.
262. H. Erden, A. D. Ebner and J. A. Ritter, "On the Development of a Novel Pressure Swing Reactor for the Production of Ammonia," AIChE Annual Meeting, Atlanta, GA, November, 2014, contributed.
261. A. Rahman, A. D. Ebner and J. A. Ritter, "Single Bed Apparatus Designed for Studying Rapid Pressure Swing Adsorption Concepts, "AIChE Annual Meeting, Atlanta, GA, November, 2014, contributed.
260. J. A. Ritter, "Frequency Response: A Powerful Technique for Discerning Gas Phase Diffusional Mechanisms and Rates in Nanoporous Adsorbents," NIST Workshop on Measurement Needs in the Adsorption Sciences, Gaithersburg, MD November, 2014, invited.
259. J. A. Ritter, "Potential of CO_2 Capture from Flue Gas by Pressure Swing Adsorption," USC Energy Leadership Institute Forum, Cradle to Grave: CO_2 Opportunities & Challenges, Columbia, SC, September, 2014, invited.
258. J. A. Ritter, "Pressure Swing Adsorption: A Ubiquitous Gas Separation Technology," 32nd International Carbon Conference, Pittsburg," PA, September, 2014, invited.
257. J. A. Ritter, "Bench-Scale Development and Testing of Rapid PSA for CO_2 Capture," 2014 NETL CO_2 Capture Technology Meeting, Pittsburgh, PA, July, 2014, invited.
256. J. A. Ritter, "New PSA Cycle for CO_2 Removal during Closed-Loop Human Space Exploration Missions," Closed Loop CO_2 Removal Workshop at NASA MSFC, Huntsville, AL, April, 2014, invited.
255. L. Erden, A. D. Ebner, M. A. Nicholson, C. E. Holland and J. A. Ritter, "On the Variability and Reproducibility of Equilibrium Adsorption Isotherm Measurements From Different Laboratories, "AIChE Annual Meeting, San Francisco, CA, November, 2013, contributed.
254. F. Wu, A. D. Ebner and J. A. Ritter, "Hybrid PSA-Distillation Process for Propane/Propylene Separation, "AIChE Annual Meeting, San Francisco, CA, November, 2013, contributed.
253. M. I. Hossain, A. D. Ebner, C. E. Holland and J. A. Ritter, "Diffusion of N_2 and CO_2 in 13X Zeolite From Volumetric Frequency Response Measurements Up to 10 Hz, "AIChE Annual Meeting, San Francisco, CA, November, 2013, contributed.
252. A. Rahman, A. D. Ebner, H. Erden, C. E. Holland and J. A. Ritter, "Rapid Cycling of Pure Gases in a Single Bed PSA Apparatus, "AIChE Annual Meeting, San Francisco, CA, November, 2013, invited.
251. N. Mohammadi, A. Abdollahi, M. A. Nicholson, A. D. Ebner, C. E. Holland and J. A. Ritter, "CO_2 Capture From Flue Gas by PSA Utilizing a Structured Adsorbent, "AIChE Annual Meeting, San Francisco, CA, November, 2013, contributed.
250. J. A. Ritter, "Pressure Swing Adsorption: A Ubiquitous Gas Separation Technology," 32nd International Carbon Conference, Pittsburg, PA, September, 2013, invited.
249. J. A. Ritter, M. I. Hossain and A. D. Ebner, "Adsorption and Diffusion of Gases in Microporous Adsorbents Using Volumetric Frequency Response," 246th ACS National Meeting, Indianapolis, IN, September, 2013, invited.

248. J. A. Ritter, "Bench-Scale Development and Testing of Rapid PSA for CO_2 Capture," 2013 NETL CO_2 Capture Technology Meeting, Pittsburgh, PA, July, 2013, invited.
247. J. A. Ritter, M. I. Hossain and A. D. Ebner, "On the Use of Volumetric Frequency Response for Determining Mass Transfer Mechanisms in Microporous Adsorbents," Eleventh International Conference on Fundamentals of Adsorption (FOA11), Baltimore, MD, May 2013, contributed.
246. J. A. Ritter, A. Abdollahi and A. D. Ebner, "On the Use of Solid Amine Sorbents for CO_2 Capture by PSA," Eleventh International Conference on Fundamentals of Adsorption (FOA11), Baltimore, MD, May 2013, contributed.
245. J. A. Ritter, A. Rahman, and A. D. Ebner, "A High Feed Throughput PSA Process for CO_2 Capture from Flue Gas," Eleventh International Conference on Fundamentals of Adsorption (FOA11), Baltimore, MD, May 2013, contributed.
244. J. A. Ritter, M. D. LeVan, P. Edwards and J. C. Knox, "Development of Pressure Swing Adsorption Technology for Spaceflight Oxygen Concentrators," NASA Human Research Program Investigators' Workshop, Houston, TX, February, 2013, invited.
243. J. A. Ritter, "Recent Advances in Pressure Swing Adsorption Technology," AIChE Annual Meeting, Pittsburgh, PA, October, 2012, invited.
242. M. I. Hossain, A. D. Ebner, and J. A. Ritter, "Experimental Characterization of Adsorbents via Volumetric Frequency Response Analysis," AIChE Annual Meeting, Pittsburgh, PA, October, 2012, contributed.
241. A. Rahman, A. D. Ebner, and J. A. Ritter, "CO_2 Capture from Flue Gas by High Feed Throughput Pressure Swing Adsorption Processes," AIChE Annual Meeting, Pittsburgh, PA, October, 2012, contributed.
240. L. Erden, A. D. Ebner, and J. A. Ritter, "PVSA Cycles for Landfill Methane Purification," AIChE Annual Meeting, Pittsburgh, PA, October, 2012, contributed.
239. F. Wu, A. D. Ebner, and J. A. Ritter, "Improved PSA Cycles for Ethanol PSA-Distillation System," AIChE Annual Meeting, Pittsburgh, PA, October, 2012, contributed.
238. A. Abdollahi Govar, A.D. Ebner, and J. A. Ritter, "Post-Combustion CO_2 Capture Using Solid Amines in a Pressure Swing Adsorption Process," AIChE Annual Meeting, Pittsburgh, PA, October, 2012, contributed.
237. J. A. Ritter, "Bench-Scale Development and Testing of Rapid PSA for CO_2 Capture," 2012 NETL CO_2 Capture Technology Meeting, Pittsburgh, PA, July, 2012, invited.
236. J. A. Ritter, A. Mehrotra, A. Abdollahi and A. D. Ebner, "CO_2 Capture from Flue Gas by Pressure Swing Adsorption," 243rd ACS National Meeting San Diego, CA, March, 2012, invited.
235. J. A. Ritter, M. D. LeVan, P. Edwards and J. C. Knox, "Development of Pressure Swing Adsorption Technology for Spaceflight Oxygen Concentrators," NASA Human Research Program Investigators' Workshop, Houston, TX, February, 2012, invited.
234. J. A. Ritter and A. D. Ebner, "A Low Energy Pressure Swing Adsorption Process for CO_2 Capture," AIChE Annual Meeting, Minneapolis, MN, October, 2011, invited.
233. J. C. Knox, J. A. Ritter, A.D. Ebner, and M. D. LeVan, "Deviations from Plug Flow and 1-D Thermal Behavior for Breakthrough Tests with Zeolite CaA and Water Vapor and Carbon Dioxide," AIChE Annual Meeting, Minneapolis, MN, October, 2011, contributed.
232. J. A. Ritter, A.D. Ebner, M. D. LeVan, P. Edwards and J. C. Knox, "Development of PSA Technology for Spaceflight Medical Oxygen Concentrators," AIChE Annual Meeting, Minneapolis, MN, October, 2011, invited.
231. A.D. Ebner, A. Abdollahi Govar and J. A. Ritter, "On the Use of a Solid Amine Sorbent for

CO_2 Capture by Pressure Swing Adsorption," AIChE Annual Meeting, Minneapolis, MN, October, 2011, contributed.

230. J. A. Ritter, "Pressure Swing Adsorption: Past, Present and Future, "International Activated Carbon Conference, Pittsburgh, PA, October, 2011, invited.
229. A.D. Ebner, M. I Hossain and J. A. Ritter, "Development of New Adsorption Cycles for Xenon Concentration from Air," AIChE Annual Meeting, Salt Lake City, UT, November, 2010, contributed.
228. A. Mehrotra, A.D. Ebner and J. A. Ritter, "Simplified Graphical Approach for Complex PSA Cycle Scheduling," AIChE Annual Meeting, Salt Lake City, UT, November, 2010, contributed.
227. A. Mehrotra, A.D. Ebner and J. A. Ritter, "Design of Pressure Swing Adsorption Cycles for Carbon Dioxide Capture from Flue Gas," AIChE Annual Meeting, Salt Lake City, UT, November, 2010, contributed.
226. J. A. Ritter, A. D. Ebner, S. Bhadra, M. A. Nicholson, and C. E., "Holland High Temperature Pressure Swing Adsorption Process for the Production of Ammonia," AIChE Annual Meeting, Salt Lake City, UT, November, 2010, contributed.
225. F. Wu, A. D. Ebner, and J. A. Ritter, "New Approach for Modeling Hybrid PSA-Distillation Processes," AIChE Annual Meeting, Salt Lake City, UT, November, 2010, contributed.
224. J. A. Ritter, "Development of Pressure Swing Adsorption Technology for Spaceflight Oxygen Concentrators," NASA Human Research Program Investigators' Workshop, Houston, TX, February, 2010, invited.
223. S. Bhadra, A. D. Ebner, C. E. Holland, and J. A. Ritter, "Carbon Monoxide Isotope Separation by Pressure Swing Adsorption," AIChE Annual Meeting, Nashville, TN, November, 2009, contributed.
222. A. Mehrotra, A. D. Ebner, C. E. Holland, and J. A. Ritter, "Influence of the PSA Cycle on CO_2 Capture from Flue Gas," AIChE Annual Meeting, Nashville, TN, November, 2009, contributed.
221. J. A. Ritter, F. Wu, and A. D. Ebner, "Overview of Hybrid PSA-Distillation Processes," AIChE Annual Meeting, Nashville, TN, November, 2009, invited.
220. J. O. Mangual, A. D. Ebner and J. A. Ritter, "Biodegradable Magnetite Stent for Implant-Assisted Magnetic Drug Targeting," AIChE Annual Meeting, Nashville, TN, November, 2009, contributed.
219. J. O. Mangual, A. D. Ebner and J. A. Ritter, "Biodegradable Magnetite Stent for Implant-Assisted Magnetic Drug Targeting," AIChE Annual Meeting, Nashville, TN, November, 2009, contributed.
218. H. Du, A. D. Ebner and J. A. Ritter, "High temperature CO_2 Capture by PSA using K-Promoted HTlc: Performance Differences due to Different CO_2 Uptake and Release Models in the Literature," AIChE Annual Meeting, Nashville, TN, November, 2009, contributed.
217. A. Mehrotra, A. D. Ebner and J. A. Ritter, "Pressure Swing Adsorption Technology for Post and Pre-Combustion Carbon Dioxide Capture," 26th Annual International Pittsburgh Coal Conference, Pittsburgh, PA, September, 2009, contributed.
216. A. D. Ebner, M. D. LeVan, J. C. Knox, and J. A. Ritter, "Unique regeneration Steps for the Sorbent-Based Atmosphere Revitalization System Designed for CO_2 and H_2O Removal from Spacecraft Cabins," International Conference on Environmental Systems," Savannah, GA, July 2009, contributed.
215. J. A. Ritter, A. D. Ebner, S. Bhadra C. E. Holland and F. Jegede, "Application of Pressure

Swing Adsorption in the Production of Ammonia," AIChE Spring National Meeting, Tampa, FL, April 2009, contributed.

214. A. Mehrotra, A. D. Ebner and J. A. Ritter, "Carbon Dioxide Capture by Pressure Swing Adsorption," AIChE Spring National Meeting, Tampa, FL, April, 2009, contributed.
213. A. Mehrotra, A. D. Ebner and J. A. Ritter, "Complexity of Cycle Scheduling in Pressure Swing Adsorption Processes," AIChE Annual Meeting, Philadelphia, PA, November, 2008, invited.
212. A. Mehrotra, A. D. Ebner and J. A. Ritter, "Pressure Swing Adsorption Cycles for Carbon Dioxide Capture," AIChE Annual Meeting, Philadelphia, PA, November, 2008, contributed.
211. S. Bhadra, C. H. Holland, M. A. Nicholson, A. D. Ebner, F. Jegede and J. A. Ritter, "Production of Ammonia with Pressure Swing Adsorption Utilized in Key Separations Steps," AIChE Annual Meeting, Philadelphia, PA, November, 2008, contributed.
220. J. O. Mangual, A. D. Ebner and J. A. Ritter, "Implant-Assisted Magnetic Drug Targeting: Design of Stent Implants," AIChE Annual Meeting, Philadelphia, PA, November, 2008, contributed.
219. H. Du, A. D. Ebner and J. A. Ritter, "Adsorption of CO_2 in K-Promoted HTlc: Temperature and Pressure Dependent Non-Equilibrium Kinetic Model," AIChE Annual Meeting, Philadelphia, PA, November, 2008, contributed.
218. A. D. Ebner, Y. Wang, J. A. Ritter, "On the Design of Hydrogen Storage Vessels Utilizing a Complex Hydride Storage Material," AIChE Annual Meeting, Philadelphia, PA, November, 2008, contributed.
217. J. A. Ritter, "Adsorption Processes: 100 Years of History," AIChE Annual Meeting, Philadelphia, PA, November, 2008, invited.
216. A. Mehrotra, A. D. Ebner and J. A. Ritter, "Pressure Swing Adsorption Technology for Carbon Dioxide Capture," 25th Annual International Pittsburgh Coal Conference, Pittsburgh, PA, October, 2008, contributed.
215. J. O. Mangual, M. O. Avilés, A. D. Ebner, and J. A. Ritter, "*In Vitro* Study of Magnetite Nanoparticles as the Implant for Implant-Assisted Magnetic Drug Targeting," 7th International Conference on the Scientific and Clinical Applications of Magnetic Carriers, Vancouver, Canada, May, 2008, contributed.
214. J. O. Mangual, M. O. Avilés, A. D. Ebner, and J. A. Ritter, "Isolated Swine Heart Ventricle Perfusion Model for Implant-Assisted Magnetic Drug Targeting," 7th International Conference on the Scientific and Clinical Applications of Magnetic Carriers, Vancouver, Canada, May, 2008, contributed.
213. F. Jegede, J. A. Ritter and A. D. Ebner, "Ammonia by Pressure Swing Adsorption," AIChE Spring National Meeting, New Orleans, LA, April 2008, contributed.
212. A. Mehrotra, A. D. Ebner and J. A. Ritter, "Vacuum Swing Adsorption Cyucles for Carbon Dioxide Capture from Flue and Stack Gases," AIChE Spring National Meeting, New Orleans, LA, April 2008, contributed.
211. A. D. Ebner, A. Mehrotra, J. C. Knox, M. D. LeVan and J. A. Ritter, "Simulation of Unique Pressure Changing Steps and Situations in PSA Processes," AIChE 2007 Annual Meeting, Salt Lake City, UT, November 2007, contributed.
210. A. D. Ebner, H. Du and J. A. Ritter, "Temperature Dependent Non-Equilibrium Kinetic Model that Describes the Reversible Adsorption and Desorption Behavior of CO_2 in a K-Promoted HTlc," AIChE 2007 Annual Meeting, Salt Lake City, UT, November 2007, contributed.

209. A. D. Ebner, Y. Wang and J. A. Ritter, "Complex Hydride Hydrogen Storage Vessel Design," AIChE 2007 Annual Meeting, Salt Lake City, UT, November 2007, contributed.
208. M. O. Avilés, J. O. Mangual, A. D. Ebner, and J. A. Ritter, "Implant Assisted Magnetic Drug Targeting: Ferromagnetic Nanoparticles for Enhancing the Retention of Magnetic Drug Carrier Particles," AIChE 2007 Annual Meeting, Salt Lake City, UT, November 2007, contributed.
207. M. O. Avilés, J. O. Mangual, A. D. Ebner, and J. A. Ritter, "Magnetic Nanoparticles for Magnetic Drug Targeting," AIChE 2007 Annual Meeting, Salt Lake City, UT, November 2007, invited.
206. A. Mehrotra, A. D. Ebner and J. A. Ritter, "Extreme Configurations in Heavy Reflux PSA Cycles," AIChE 2007 Annual Meeting, Salt Lake City, UT, November 2007, contributed.
205. J. A. Ritter and C. E. Holland, "The Chemical Engineering Laboratory Experience at the University of South Carolina," AIChE 2007 Annual Meeting, Salt Lake City, UT, November 2007, invited.
204. J. O. Mangual, M. O. Avilés, A. D. Ebner, and J. A. Ritter, "Ferromagnetic Nanoparticle Scaffold for Studying Seeds as an Implant for Magnetic Drug Targeting," BMES 2007 Annual Meeting, Los Angeles, CA, September 2007, contributed.
203. M. O. Avilés, J. O. Mangual, A. D. Ebner, and J. A. Ritter, "*In Vitro* and Theoretical Advances in the Study of Implant Assisted Magnetic Drug Targeting," BMES 2007 Annual Meeting, Los Angeles, CA, September 2007, contributed.
202. J. A. Ritter, A. D. Ebner, S. P Reynolds, J. C. Knox and L. D. LeVan, "Design and Performance of the Sorbent-Based Atmosphere Revitalization System for the Orion," 37th International Conference on Environmental Systems," Chicago, IL, July 2007, contributed.
201. S. P. Reynolds, A. D. Ebner, J. C. Knox, M. D. LeVan and J. A. Ritter, "Simulation of Novel Pressure Changing Steps and Extreme Conditions in PSA Processes," Fundamentals of Adsorption FOA9, Giardini Naxos, Italy, May 2007, contributed.
200. Y. Wang, A. D. Ebner and J. A. Ritter, "Rapid Charging of a Metal Hydride Hydrogen Storage Bed: Two-Dimensional Model Validation and System Design," Fundamentals of Adsorption FOA9, Giardini Naxos, Italy, May 2007, contributed.
199. S. P. Reynolds, A. Mehrotra, A. D. Ebner and J. A. Ritter, "Novel Heavy Reflux Cycles in Pressure Swing Adsorption Processes," Fundamentals of Adsorption FOA9, Giardini Naxos, Italy, May 2007, contributed.
198. T. Wang, J. Wang, M. A. Nicholson, A. D. Ebner and J. A. Ritter, "Reversible Hydrogen Storage in High Temperature Complex Hydrides," Fundamentals of Adsorption FOA9, Giardini Naxos, Italy, May 2007, invited plenary.
197. A. D. Ebner, Y. Wang and J. A. Ritter, "Two-Dimensional Model for Rapid Charging of a Metal Hydride Hydrogen Storage Bed," 2nd Annual Korean-USA Joint Symposium on Hydrogen and Fuel Cell Technologies, Columbia, SC, May 2007, invited.
196. J. Wang, T. Wang, M. A. Nicholson, A. D. Ebner and J. A. Ritter, "High Capacity and High Temperature Complex Hydrides for Reversible Hydrogen Storage," 2nd Annual Korean-USA Joint Symposium on Hydrogen and Fuel Cell Technologies, Columbia, SC, May 2007, invited.
195. J. Wang, A. D. Ebner and J. A. Ritter, "New Synthesis Route for Complex Hydride Hydrogen Storage Materials," AIChE 2007 Spring National Meeting, Houston, TX, April 2007, contributed.
194. M. O. Aviles, A. D. Ebner and J. A. Ritter, "Studies of Implant Assisted Magnetic Drug Targeting, "AIChE 2006 Annual Meeting, San Francisco, CA, November 2006,

contributed.

193. A. D. Ebner, S. P. Reynolds and J. A. Ritter, "Non-Equilibrium Kinetic Model for the Reversible Adsorption of CO_2 on a K-Promoted HTlc," AIChE 2006 Annual Meeting, San Francisco, CA, November 2006, contributed.
192. J. Wang, T. Wang, M. A. Nicholson, A. D. Ebner and J. A. Ritter, "High Capacity Reversible Hydrogen Storage Materials," AIChE 2006 Annual Meeting, San Francisco, CA, November 2006, contributed.
191. J. A. Ritter, S. P. Reynolds, A. D. Ebner, M. D. LeVan and J. C. Knox, "Layered Bed PSA Cycle for the Atmosphere Revitalization System of the NASA Crew Exploration Vehicle, Orion," AIChE 2006 Annual Meeting, San Francisco, CA, November 2006, contributed.
190. M. O. Aviles, A. D. Ebner and J. A. Ritter, "On the Use of a Ferromagnetic Stent for Implant Assisted Magnetic Drug Targeting, "AIChE 2006 Annual Meeting, San Francisco, CA, November 2006, contributed.
189. S. P. Reynolds, A. D. Ebner and J. A. Ritter, "Novel Heavy Reflux PSA Cycles for the Recovery of Carbon Dioxide at High Temperature with K-Promoted HTlc," AIChE 2006 Annual Meeting, San Francisco, CA, November 2006, contributed.
188. A. D. Ebner, Y. Yang and J. A. Ritter, "Simulation of the Rapid Charging of a Metal Hydride Hydrogen Storage System," AIChE 2006 Annual Meeting, San Francisco, CA, November 2006, contributed.
187. J. Wang, T. Wang, M. A. Nicholson, A. D. Ebner and J. A. Ritter, "Synthesis of Metal Complex Hydride Reversible Hydrogen Storage Materials," AIChE 2006 Annual Meeting, San Francisco, CA, November 2006, contributed.
186. M. O. Aviles, A. D. Ebner, and J. A. Ritter, "Ferromagnetic Stents for Implant Assisted Magnetic Drug Targeting," BMES 2006 Annual Meeting, Chicago, IL, October 2006 contributed.
185. S. P Reynolds, A. D. Ebner and J. A. Ritter, "Simulation of Real-Time Dynamic Cabin Conditions in the Crew Exploration Vehicle to Determine the Effects on the Sorbent-Based Atmosphere Revitalization System," Norfolk, VA, July 2006, contributed.
184. S. P Reynolds, A. D. Ebner, J. A. Ritter, J. C. Knox and L. D. LeVan, "Mathematical Simulation of the Sorbent-Based Atmosphere Revitalization System for the Crew Exploration Vehicle," 36th International Conference on Environmental Systems," Norfolk, VA, July 2006, contributed.
183. T. Wang, J., Wang, A. D. Ebner, and J. A. Ritter, "Adsorption and Desorption of Hydrogen in Sodium Aluminum Hydride Co-Doped with Zr and Ti," 4th Pacific Basin Conference on Adsorption Science and Technology, Tianjin, China, May 2006, contributed.
182. S. P. Reynolds, A. D. Ebner, and J. A. Ritter, "Non-Equilibrium Dynamic Adsorption and Desorption Isotherms of CO_2 on a K-Promoted HTlc," 4th Pacific Basin Conference on Adsorption Science and Technology, Tianjin, China, May 2006, contributed.
181. S. P. Reynolds, A. D. Ebner, and J. A. Ritter, "Capture of CO_2 from Flue gas by PSA using K-Promoted HTlc: Mass Transfer Effects," 4th Pacific Basin Conference on Adsorption Science and Technology, Tianjin, China, May 2006, contributed.
180. M. O. Aviles, A. D. Ebner, and J. A. Ritter, "*In Vitro* and Theoretical Advances in the Study of Stents for Implant-Assisted Magnetic Drug Targeting," 6th International Conference of the Scientific Applications of Magnetic Carriers, Krems, Austria, May 2006, contributed.
179. M. O. Aviles, A. D. Ebner, F. Rainsford and J. A. Ritter, "*In Vitro* Studies of Implant-Assisted Magnetic Drug Targeting with a Single Ferromagnetic Wire as a First Step Toward *In Vivo* Studies with Animal Models," 6th International Conference of the

Scientific Applications of Magnetic Carriers, Krems, Austria, May 2006, contributed.

178. A. D. Ebner and J. A. Ritter, "Adsorption and Membrane Processes in Hydrogen Production," 2006 AIChE Spring National Meeting, Orlando, FL, April 2006, contributed.
177. J. A. Ritter and A. D. Ebner, "State-of-the-Art Adsorption and Membrane Separation Processes for H_2 Production in the Chemical and Petrochemical Industries," 2006 AIChE Spring National Meeting, Orlando, FL, April 2006, invited.
176. J. Wang, T. Wang, A. D. Ebner and J. A. Ritter, "Physiochemical Pathway to reversible Hydrogen in Complex Hydrides," TMS 2006: 125th Annual Meeting and Exhibition, San Antonio, TX, March, 2006, invited.
175. J. A. Ritter, M. O. Aviles and A. D. Ebner, "Implant-Assisted Magnetic Drug Targeting," International E-Symposium on Pharmaceutical Engineering, Video Conference, Broadcast Live from USC to Bharathidasan University, India, March 2006, invited.
174. A. D. Ebner, M. O. Aviles, and J. A. Ritter, "Magnetic Implants for Magnetic Drug Targeting," Pacific Polymer Federation IX Conference, Maui, Hawaii, December 2005, invited.
173. M. O. Aviles, A. D. Ebner and J. A. Ritter, "In Vitro Studies of Implant Assisted Magnetic Drug Targeting," Pacific Polymer Federation IX Conference, Maui, Hawaii, December 2005, invited.
172. H. Chen, A. D. Ebner, J. A. Ritter, S. Guy, A. J. Rosengart and M. D. Kaminski, "Development of a Magnetic Separator for Sequestration of Magnetic Microspheres Designed for Ex-Vivo Blood Detoxification," AIChE 2005 Annual Meeting, Cincinnati, OH, November 2005, contributed.
171. M. O. Aviles, A. D. Ebner and J. A. Ritter, "In Vitro Studies of Ferromagnetic Coils for Implant Assisted Magnetic Drug Targeting," AIChE 2005 Annual Meeting, Cincinnati, OH, November 2005, contributed.
170. M. O. Aviles, A. D. Ebner and J. A. Ritter, "High Gradient Magnetic Implants: A More Effective Approach to Magnetic Drug Targeting," AIChE 2005 Annual Meeting, Cincinnati, OH, November 2005, contributed.
169. J. Wang, T. Prozorov. T. Wang, A. D. Ebner and J. A. Ritter, "Hydrogen Storage in Complex Hydrides: Reversible Reaction that Mimics Adsorption Behavior," AIChE 2005 Annual Meeting, Cincinnati, OH, November 2005, contributed.
168. S. P. Reynolds, A. D. Ebner, and J. A. Ritter, "Concentration and Recovery of Carbon Dioxide at High Temperature with Heavy Reflux PSA Cycles," AIChE 2005 Annual Meeting, Cincinnati, OH, November 2005, contributed.
167. S. P. Reynolds, A. D. Ebner, and J. A. Ritter, "Dynamic Adsorption and Desorption of CO_2 in K-Promoted Hydrotalcite," AIChE 2005 Annual Meeting, Cincinnati, OH, November 2005, contributed.
166. H. Chen, P. Caviness, M. D. Kaminski, A. D. Ebner, J. A. Ritter, V. Balasubramanian, S. Guy, and A. J. Rosengart, "Prototype Designs of Portable Magnetic Separators for Extracorporeal Detoxification," Biomedical Engineering Society 2005 Annual Fall Meeting, Baltimore, MD, September 2005, contributed.
165. H. Chen, M. D. Kaminski A. D. Ebner, J. A. Ritter and A. J. Rosengart and, "Magnetizable Intravascular Stents for Sequestration of Systematically Circulating Magnetic Drug Carriers," 3rd International IEEE-EMBS Special Topic Conference of Microtechnologies in Medicine and Biology, Oahu, Hawaii, May 2005, contributed.
164. J. A. Ritter, "Is Hydrogen Storage Truly a Roadblock to the Hydrogen Economy?" FuelCellSouth, Columbia, SC May 2005, invited.

163. J. A. Ritter, "Adsorption Tutorial," AIChE 2005 Spring National Meeting, Atlanta, GA, April 2005, invited.
162. S. P. Reynolds, J. A. McIntyre, A. D. Ebner, and J. A. Ritter, "Emerging Applications for PSA Cycles Based on the Heavy Reflux Concept," AIChE 2004 Annual Meeting, Austin, TX, November 2004, contributed.
161. S. Gadre, C. Orvedal, A. D. Ebner and J. A. Ritter, "Understanding the Charge Behavior of Metal Hydride Hydrogen Storage Systems, AIChE 2004 Annual Meeting, Austin, TX, November 2004, contributed.
160. J. Wang, T. Prozorov, A. D. Ebner and J. A. Ritter, "Novel Complex Hydrides for Reversible Hydrogen Storage," AIChE 2004 Annual Meeting, Austin, TX, November 2004, contributed.
159. J. A. Ritter, S. P. Reynolds, S. A. Gadre, and A. D. Ebner, "High Temperature Heavy Reflux PSA Cycles for Carbon Dioxide Concentration and Recovery from Stack Gases," AIChE 2004 Annual Meeting, Austin, TX, November 2004, contributed.
158. M. O. Aviles, A. D. Ebner, H. Chen, A. J. Rosengart, M. D. Kaminski, and J. A. Ritter, "Transdermal Ferromagnetic Implants for Retention, Retrieval and Guidance of Magnetic Drug Carrier Particles," AIChE 2004 Annual Meeting, Austin, TX, November 2004, contributed.
157. M. O. Aviles, A. D. Ebner, A. J. Rosengart, M. D. Kaminski, and J. A. Ritter, "Applicability of High Gradient Magnetic Separation Principles to Magnetic Drug Targeting," AIChE 2004 Annual Meeting, Austin, TX, November 2004, contributed.
156. A. D. Ebner, M. O. Aviles, A. J. Rosengart, M. D. Kaminski, and J. A. Ritter, "Non-Invasive Magnetic Drug Targeting Based on Ferromagnetic Seeding," AIChE 2004 Annual Meeting, Austin, TX, November 2004, contributed.
155. H. Chen, A. D. Ebner, A. J. Rosengart, M. D. Kaminski, and J. A. Ritter, "Magnetizable Intravascular Stents for Retention of Blood Borne Magnetic Drug Carrier Particles," AIChE 2004 Annual Meeting, Austin, TX, November 2004, contributed.
154. H. Chen, P. L. Caviness, A. J. Rosengart, M. D. Kaminski, V. Balasubramanian A. D. Ebner, S. G. Guy, and J. A. Ritter, "Sequestration of Blood Borne Magnetic Drug Carrier Particles with Magnetizable Intravascular Stents," BMES 2004 Annual Fall Meeting, Philadelphia, PA, October 2004, contributed.
153. S. A. Gadre, A. D. Ebner and J. A. Ritter, "Two and Three Dimensional Models for the Design of Metal Hydride Hydrogen Storage Systems," 8th International Conference on Fundamentals of Adsorption FOA8, Sedona, AZ, May 2004, contributed.
152. S. P Reynolds, A. D. Ebner and J. A. Ritter, "New Pressure Swing Adsorption Cycles for Carbon Dioxide Sequestration," 8th International Conference on Fundamentals of Adsorption FOA8, Sedona, AZ, May 2004, contributed.
151. J. Wang, A. D. Ebner and J. A. Ritter, "On the Reversibility of Hydrogen in Novel Complex Hydrides," 8th International Conference on Fundamentals of Adsorption FOA8, Sedona, AZ, May 2004, contributed.
150. N. D. Hutson, S. A. Gadre, A. D. Ebner and J. A. Ritter, "Separation and Capture of CO_2 using a High Temperature Pressure Swing Adsorption System," Third Annual Conference of Carbon Capture & Sequestration, Alexandria, VA, May 2004, invited.
149. A. J. Rosengart, M. D. Kaminski, P. L. Caviness, C. J. Mertz, H. Chen, V. Balasubramanian, A. D. Ebner, and J. A. Ritter, "How to Achieve and Optimize Separation of Magnetic Carriers from Pulsatile Blood," 5th International Conference on the Scientific and Clinical Applications of Magnetic Carriers, Lyon, France, May 2004, contributed.

148. A. L. Stanley, A. D. Ebner, M. D. Kaminski, A. J. Rosengart, and J. A. Ritter, "Feasibility of High gradient Magnetic Implants for Magnetic Drug Targeting," 5th International Conference on the Scientific and Clinical Applications of Magnetic Carriers, Lyon, France, May 2004, contributed.
147. M. D. Kaminski, A. J. Rosengart, A. D. Ebner, H. Chen, S. G. Guy, C. J. Mertz, P. L. Caviness and J. A. Ritter, "Magnetizable Intraluminal Stent and Functionalized Magnetic Carriers: A Novel Approach for Noninvasive yet Targeted Drug Delivery," 5th International Conference on the Scientific and Clinical Applications of Magnetic Carriers, Lyon, France, May 2004, contributed.
146. M. O. Aviles, A. D. Ebner, H. Chen, M. D. Kaminski, A. J. Rosengart and J. A. Ritter, "Theoretical Analysis of Transdermal Ferromagnetic Implants for Retention, Retrieval and Guidance or Magnetic Drug Carrier Particles," 5th International Conference on the Scientific and Clinical Applications of Magnetic Carriers, Lyon, France, May 2004, contributed.
145. A. D. Ebner, A. L. Stanley, M. D. Kaminski, A. J. Rosengart and J. A. Ritter, "Analysis of High gradient Ferromagnetic Seeding for Targeted Drug Delivery," 5th International Conference on the Scientific and Clinical Applications of Magnetic Carriers, Lyon, France, May 2004, contributed.
144. H. Chen, A. D. Ebner, J. A. Ritter, M. D. Kaminski, and A. J. Rosengart, "Feasibility of Magnetizable Stents for Sequestering Blood Borne Magnetic Drug Carrier Particles," 5th International Conference on the Scientific and Clinical Applications of Magnetic Carriers, Lyon, France, May 2004, contributed.
143. A. D. Ebner, A. L. Stanley, M. D. Kaminski, A. J. Rosengart and J. A. Ritter, "Theoretical Analysis of Ferromagnetic Seeding for Magnetic Drug Targeting," 5th International Conference on the Scientific and Clinical Applications of Magnetic Carriers, Lyon, France, May 2004, contributed.
142. A. J. Rosengart, M. D. Kaminski, A. D. Ebner, U. Hafeli and J. A. Ritter, "Magnetically Guided and Targeted Drug Delivery Utilizing a Novel Magnetizable Vascular Stent and Magnetic Nanospheres," European Stroke Conference, Mannhein-Heidelberg, Germany, May 2004, contributed.
141. H. Chen, M. Dd Kaminski, A. D. Ebner, V. Balasubramanian, Y. Xie, S. G. Guy, J. A. Ritter, V. T. Turitto, U. Häfeli and A. J. Rosengart. "Feasibility of using a magnetizable vascular stent to sequester systemically circulating medicated magnetic particles," Joint Annual Meeting of the AANS/CNS Cerebrovascular Section and the American Society of Interventional & Therapeutic Neuroradiology, San Diego, CA, February 2004, contributed.
140. M. D. Kaminski, A. J. Rosengart, V. Turitto, J. A. Ritter and A. Ebner, "The Design and Development of a Novel Platform Technology for Rapid, Efficient, and Portable Detoxification of Blood-Borne Toxins," GRC on Chemical and Biological Terrorism Defense, Santa Barbara, CA, January 2004, contributed.
139. J. A. Mc Intyre, N. D. Hutson, A. D. Ebner and J. A. Ritter, "New Adsorption Technology for Carbon Dioxide Sequestration," AIChE 2003 Annual Meeting, San Francisco, CA, November 2003, invited.
138. S. A. Gadre, A. D. Ebner and J. A. Ritter, "Two-Dimensional Models for the Design of Metal Hydride Hydrogen Storage Systems," AIChE 2003 Annual Meeting, San Francisco, CA, November 2003, contributed.
137. A. D. Ebner and J. A. Ritter, "On the Use of Magnetic Implants for Targeted Drug Delivery," AIChE 2003 Annual Meeting, San Francisco, CA, November 2003, contributed.

136. A. D. Ebner and J. A. Ritter, "Buoyancy Correction Methodology to Account for Temperature Imbalances In High Pressure Gravimetric Microbalances," AIChE 2003 Annual Meeting, San Francisco, CA, November 2003, contributed.
135. S. P. Reynolds, A. D. Ebner and J. A. Ritter, "Empirical Correlation for the Design of Dual Reflux Pressure Swing Adsorption Columns," AIChE 2003 Annual Meeting, San Francisco, CA, November 2003, contributed.
134. J. A. McIntyre, S. P. Reynolds, A. D. Ebner, and J. A. Ritter, "Multicomponent Fractionation by CasCade Dual Reflux Pressure Swing Adsorption," AIChE 2003 Annual Meeting, San Francisco, CA, November 2003, contributed.
133. J. Wang, A. D. Ebner, J. A. Ritter, and R. Zidan, "Reversibility of Na, Li and Mg Complex Hydrides for Hydrogen Storage," AIChE 2003 Annual Meeting, San Francisco, CA, November 2003, invited.
132. J. Wang, A. D. Ebner, K. Edison, C. T. Williams, J. A. Ritter, and R. Zidan , "Reversible Chemical Hydrides for Solid Hydrogen Storage," AIChE 2003 Annual Meeting, San Francisco, CA, November 2003, contributed.
131. J. A. Mc Intyre, A. D. Ebner and J. A. Ritter, "Hydrogen Purification by Dual Reflux Pressure Swing Adsorption," 13th Symposium on Separation Science and Technology for Energy Applications, Gatlinburg, Tennessee, October 2003, contributed.
130. J. A. Mc Intyre, N. D. Hutson, A. D. Ebner and J. A. Ritter, "New Adsorption Technology for Carbon Dioxide Sequestration," 13th Symposium on Separation Science and Technology for Energy Applications, Gatlinburg, Tennessee, October 2003, contributed.
129. J. Wang, A. D. Ebner, K. R. Edison, J. A. Ritter and R. Zidan, "Metal Doped Sodium Aluminum Hydride as a Reversible Hydrogen Storage Material," 3rd Pacific Basin Conference on Adsorption Science and Technology, Kyongju, Korea, May 2003, contributed.
128. A. D. Ebner and J. A. Ritter, "Dual Reflux Pressure Swing Adsorption Cycle for Gas Separation and Purification," 3rd Pacific Basin Conference on Adsorption Science and Technology, Kyongju, Korea, May 2003, contributed.
127. S. A. Gadre, A. D. Ebner, S. A. Al-Muhtaseb and J. A. Ritter, "Modeling the Discharge Behavior of Metal Hydride Hydrogen Storage Systems," 3rd Pacific Basin Conference on Adsorption Science and Technology, Kyongju, Korea, May 2003, contributed.
126. S. A. Gadre, A. D. Ebner, and J. A. Ritter, "Performance of a Metal Hydride Hydrogen Storage System," 225th ACS National Meeting, New Orleans, LA, March 2003, contributed.
125. J. Wang, A. D. Ebner, K. R. Edison, J. A. Ritter and R. Zidan, "Performance of Metal Doped Sodium Aluminum Hydride for Reversible Hydrogen Storage," 225th ACS National Meeting, New Orleans, LA, March 2003, contributed.
124. A. D. Ebner, K. D. Daniel and J. A. Ritter, "Novel Permanent Magnet Configurations for Small-Scale HGMS," 225th ACS National Meeting, New Orleans, LA, March 2003, contributed.
123. A. D. Ebner, K. D. Daniel and J. A. Ritter, "High Gradient Magnetic Implants for Targeted Drug Delivery," 225th ACS National Meeting, New Orleans, LA, March 2003, contributed.
122. A. D. Ebner and J. A. Ritter, "New Pressure Swing Adsorption Cycles for Gas Separation and Purification," 225th ACS National Meeting, New Orleans, LA, March 2003, invited.
121. S. A. Gadre, A. D. Ebner, and J. A. Ritter, "Metal Hydride Hydrogen Storage System Modeling," National Hydrogen Association's 14th Annual US Hydrogen Conference,

Washington, DC, March 2003, contributed.

120. J. Wang, A. D. Ebner, J. A. Ritter and R. Zidan, "Metal Doped Sodium Aluminum Hydride as a Reversible Hydrogen Storage Material," National Hydrogen Association's 14th Annual US Hydrogen Conference, Washington, DC, March 2003, contributed.
119. Separation, Purification and Storage by Adsorption: Thoughts for the Next Decade, AIChE Annual Meeting, Indianapolis, IN, November 2002, invited.
118. Zeolite Parallel Passage Contactor, AIChE Annual Meeting, Indianapolis, IN, November 2002, contributed.
117. Pore Structures of Resorcinol-Formaldehyde Carbon Aerogels and Xerogels, AIChE Annual Meeting, Indianapolis, IN, November 2002, contributed.
116. Quest for Tailoring the Pore Size Distribution of Resorcinol-Formaldehyde Carbon Aerogels and Xerogels by Experimental Design, AIChE Annual Meeting, Indianapolis, IN, November 2002, contributed.
115. Equilibrium Theory Analysis and Feasibility of New Rectifying PSA Cycles for Producing Pure Heavy Component, AIChE Annual Meeting, Indianapolis, IN, November 2002, contributed.
114. Equilibrium Theory Analysis of the Effect of Langmuir-Type Isotherms on Rectifying PSA, AIChE Annual Meeting, Indianapolis, IN, November 2002, contributed.
113. What Can Possibly be New and Exciting about Pressure Swing Adsorption? AIChE Annual Meeting, Indianapolis, IN, November 2002, invited.
112. Dual Reflux Pressure Swing Adsorption Process for Concentrating Dilute Feeds at High Recovery, AIChE Annual Meeting, Indianapolis, IN, November 2002, contributed.
111. Adsorption of H_2 on Pd and Ti Doped Multiwalled Carbon Nanotubes, AIChE Annual Meeting, Indianapolis, IN, November 2002, contributed.
110. Is the Magneto-Manipulation of Single Walled Nanotubes Feasible? AIChE Annual Meeting, Indianapolis, IN, November 2002, contributed.
109. On the Synergistic Effects in the Retention of Paramagnetic Particles by Cluster of Equally Spaced Magnetite Particles, AIChE Annual Meeting, Indianapolis, IN, November 2002, contributed.
108. Practical Modeling of Metal Hydride Hydrogen Storage Systems, AIChE Annual Meeting, Indianapolis, IN, November 2002, contributed.
107. Study and Validation of a Virtual Single Wire HGMS Testing Unit, AIChE Annual Meeting, Indianapolis, IN, November 2002, contributed.
106. Performance of Doped Chemical Hydrides for Reversible Hydrogen Storage, AIChE Annual Meeting, Indianapolis, IN, November 2002, contributed.
105. Modeling the Discharge Behavior of a Metal Hydride Hydrogen Storage System, 224th National Meeting of the American Chemical Society, Boston, MA, August 2002, contributed.
104. Development of a Reversible Hydrogen Storage Material from Metal Doped Sodium Aluminum Hydride, 224th National Meeting of the American Chemical Society, Boston, MA, August 2002, contributed.
103. Concentrating Dilute Hydrogen Streams with a Metal Hydride Based Pressure Swing Adsorption Process, 224th National Meeting of the American Chemical Society, Boston, MA, August 2002, contributed.
102. What Can Possibly Be New and Exciting about Pressure Swing Adsorption? 4th Brazilian Meeting on Adsorption, Rio de Janeiro, Brazil, May 2002, invited.
101. Nonisothermal Adsorption Dynamics and its Role in the Modeling of PSA-Solvent Vapor

Recovery Processes, AIChE Annual Meeting, Reno, NV, November 2001, contributed.

100. Simple and Complex Models for the Design of H_2 Storage Systems, AIChE Annual Meeting, Reno, NV, November 2001, contributed.
99. Equilibrium Theory Analysis of a Rectifying Pressure Swing Adsorption Process for Producing Pure Heavy Component, AIChE Annual Meeting, Reno, NV, November 2001, contributed.
98. On the Development of Novel Adsorbent Materials for Hydrogen Storage Systems, AIChE Annual Meeting, Reno, NV, November 2001, contributed.
97. Equilibrium Theory Analysis of the Approach to the Periodic State in a Pressure Swing Adsorption Cycle Utilizing an Unfavorable Langmuir Isotherm," AIChE Annual Meeting, Reno, NV, November 2001, contributed.
96. Adsorption Process Modeling: State of the Art, AIChE Annual Meeting, Reno, NV, November 2001, invited.
95. Solid State Diffusion in Insertion Electrodes, 200th Meeting of The Electrochemical Society Inc., San Francisco, CA, September 2001, contributed.
94. Equilibrium Theory Analysis of the Approach to the Periodic State in a Pressure Swing Adsorption Cycle Utilizing an Unfavorable Langmuir Isotherm, 7th International Conference on Fundamentals of Adsorption, Nagasaki, Japan, May 2001, contributed.
93. Enriching Reflux Pressure Swing Adsorption for Enrichment of Trace Components, 7th International Conference on Fundamentals of Adsorption, Nagasaki, Japan, May 2001, contributed.
92. High Enrichment of Dilute VOCs by Pressure Swing, 7th International Conference on Fundamentals of Adsorption, Nagasaki, Japan, May 2001, contributed.
91. Novel Adsorbent Materials for Use in Separation Processes and Energy Storage Systems, 7th International Conference on Fundamentals of Adsorption, Nagasaki, Japan, May 2001, contributed.
90. Extreme Temperature, Pressure and Loading Effects on the Kinetic Behavior of PSA Processes, 7th International Conference on Fundamentals of Adsorption, Nagasaki, Japan, May 2001, contributed.
89. Magnetite-Silica Composite as Alternative Magnetic Matrix in HGMS, 2001 ACS Annual Meeting, San Diego, CA, April 2001.
88. Concentration of Dilute Sludge Wastes with HGMS, 2001 ACS Annual Meeting San Diego, CA, April 2001.
87. Magnetic Hetero-Flocculation of Paramagnetic Colloidal Particles by a 3-D Array of Magnetite Particles: A Materials Design Issue, 2001 ACS Annual Meeting San Diego, CA, April 2001.
86. Sol-Gel Derived Nanostructured Materials for Use in Energy Storage Systems, AIChE Annual Meeting, Los Angeles, CA, November 2000, contributed.
85. Nanostructured Materials for Use in Gas Phase Adsorption Processes, AIChE Annual Meeting, Los Angeles, CA, November 2000, contributed.
84. Experimental Studies on the Ultimate Retention of Fe_2O_3 in High Gradient Magnetic Separation, AIChE Annual Meeting, Los Angeles, CA, November 2000, contributed.
83. Magnetic Hetero-Flocculation of Paramagnetic Colloidal Particles by a Three Dimensional Array of Magnetite Particles, AIChE Annual Meeting, Los Angeles, CA, November 2000, contributed.
82. Pore and Surface Diffusion Behavior in PSA-Solvent Vapor Recovery Processes: Temperature, Pressure and Loading Effects, AIChE Annual Meeting, Los Angeles, CA, November 2000, contributed.

81. Concentrating Dilute Hydrocarbons by Enriching Reflux-Pressure Swing Adsorption, AIChE Annual Meeting, Los Angeles, CA, November 2000, contributed.
80. Modeling the Discharge of Electrode Particles: Utility of the Parabolic Concentration Profiles, 198th Meeting of The Electrochemical Society Inc., Phoenix, AR, October 2000, contributed.
79. Two-Stage PSA for Enrichment of Trace Xenon from Atmospheric Air, The 2nd Pacific Basin Conference of Adsorption Science and Technology, Brisbane, Australia, May 2000, contributed.
78. High Gradient Magnetic Separation for the Treatment of Dilute Sludge Wastes, AIChE Annual Meeting, Dallas TX, November 1999, contributed.
77. Sol-Gel Derived Inorganic Oxide Materials for Use in Separation Processes, AIChE Annual Meeting, Dallas TX, November 1999, contributed.
76. New Pressure Swing Adsorption-Solvent Vapor Recovery Cycles for Improved Solvent Vapor Enrichment, AIChE Annual Meeting, Dallas TX, November 1999, contributed.
75. Development of Ni Composite Coated Graphite as an Anode for Li-Ion Batteries with PC-Based Electrolyte, 196th Meeting of The Electrochemical Society Inc., Honolulu, Hawaii, October, 1999.
74. High Performance Pd-Coated Graphite for Li-Ion Batteries with PC-Based Electrolyte, 196th Meeting of The Electrochemical Society Inc., Honolulu, Hawaii, October, 1999.
73. Experimental and Theoretical Investigation on the New Magsorb Process for Treating Aqueous Wastes, Eleventh Symposium on Separation Science and Technology for Energy Applications, Gatlinburg, Tennessee, October 1999, contributed.
72. On the Use of High Gradient Magnetic Separation for Concentrating Dilute Sludge Wastes, Eleventh Symposium on Separation Science and Technology for Energy Applications, Gatlinburg, Tennessee, October 1999, contributed.
71. Modification of the Pore Structure of Carbon Aerogels and Xerogels for Energy Storage, 24th Biennial Conference on Carbon, Charleston, SC, July 1999, contributed.
70. On Deriving Thermodynamic Properties from the Adsorption Isotherm, 24th Biennial Conference on Carbon, Charleston, SC, July 1999, contributed.
69. Surface Groups of Carbon-Composite Adsorbents Characterized by Proton Affinity Distribution, 24th Biennial Conference on Carbon, Charleston, SC, July 1999, contributed.
68. On the Use of Composite Iron Oxide Materials for Magnetically-Enhanced Separation Processes, United Engineering Foundation Conference on Metal Separation Technologies Beyond 2000: Integrating Novel Chemistry with Processing, Oahu, Hawaii, June 1999, invited.
67. Sol-Gel Derived Inorganic Oxide Materials for Use in Separation Processes, 217th National Meeting of the American Chemical Society, Anaheim, CA, March 1999, invited.
66. On the Temperature Dependence of the Isosteric Heat of Adsorption, AIChE Annual Meeting, Miami, FL, November 1998.
65. Sol-Gel Route for Making Carbon-Metal Oxide Supercapacitors, AIChE Annual Meeting, Miami, FL, November 1998.
64. Controlled Pore Materials for Novel Adsorption Processes, AIChE Annual Meeting, Miami, FL, November 1998.
63. Simulation of a Full-Scale Multicomponent PSA-Solvent Vapor Recovery Process, AIChE Annual Meeting, Miami, FL, November 1998.
62. Electrical Potential and Capacitance Profiles at a Graphite-Water Interface Calculated by Molecular Dynamics Simulations, AIChE Annual Meeting, Miami, FL, November 1998.

61. Sol-Gel Derived Carbon Aerogels and Xerogels for use as the Anode in the Lithium Ion Battery, 194th Meeting of The Electrochemical Society Inc., Boston, MA, November, 1998.
60. Sol-Gel Derived Carbon-Ruthenium Xerogels for use as Electrochemical Capacitors, 194th Meeting of The Electrochemical Society Inc., Boston, MA, November, 1998.
59. Theoretical Analysis of an Electrochemical Capacity with Double Layer and Faradaic Processes, 194th Meeting of The Electrochemical Society Inc., Boston, MA, November, 1998.
58. Nanolevel High Gradient Magnetic Separation for Wastewater Treatment, Emerging Technologies in Hazardous Waste Management X, Boston, MA, August, 1998.
57. Sol-Gel Derived Adsorbents for Gas Separation and Purification, Fundamentals of Adsorption FOA6, Presquile de Giens, France, May 1998.
56. Binary Isosteric Heats of Adsorption in Activated Carbon Predicted from Density Functional Theory, Fundamentals of Adsorption FOA6, Presquile de Giens, France, May 1998.
55. Prediction of Single and Binary Isosteric Heats of Adsorption, Fundamentals of Adsorption FOA6, Presquile de Giens, France, May 1998.
54. Multicomponent Solvent Vapor Recovery by Pressure Swing Adsorption, Fundamentals of Adsorption FOA6, Presquile de Giens, France, May 1998.
53. Performance of Carbon Xerogels as Double Layer Capacitors, 193rd Meeting of The Electrochemical Society Inc., San Diego, CA, May 1998.
52. Radioactive Wastewater Treatment using Nanolevel High Gradient Magnetic Separation, 22nd Annual Actinide Separations Conference, Chattanooga, TN, April 1998.
51. Potentially-Enhanced Complexation Model for the Determination of Isopotential Equilibrium Curves," AIChE Annual Meeting, Los Angeles, CA, November 1997, contributed.
50. On the use of Tapered Columns in PSA Processes, AIChE Annual Meeting, Los Angeles, CA, November 1997, invited.
49. Butane Vapor Recovery by Pressure Swing Adsorption, AIChE Annual Meeting, Los Angeles, CA, November 1997, contributed.
48. Calculation of Isosteric Heats for Simple Fluids on Model Carbons, AIChE Annual Meeting, Los Angeles, CA, November 1997, contributed.
47. Measurement and Prediction of the Adsorbed Phase Heat Capacity, AIChE Annual Meeting, Los Angeles, CA, November 1997, contributed.
46. High Gradient Magnetic Separation for the Pretreatment of Radioactive and Mixed Wastes, Tenth Symposium on Separation Science and Technology for Energy Applications, Gatlinburg, TN, October 1997, contributed.
45. New Magnetic Field-Enhanced Process for the Treatment of Aqueous Wastes, Tenth Symposium on Separation Science and Technology for Energy Applications, Gatlinburg, TN, October 1997, contributed.
44. Potentially-Enhanced Complexation Model for the Electrosorption of Metal Ions, 214th ACS National Meeting, Las Vegas, NV, September 1997, contributed.
43. Development of a Novel Magnetite-Silica Gel Composite Adsorbent for Metal Ion Adsorption, 214th ACS National Meeting, Las Vegas, NV, September 1997, invited.
42. Some Recent Developments in Using Iron Oxide Adsorbents for Chemical Separations," 21st Annual Actinide Separations Conference, Charleston, SC, June 1997.
41. Novel Synthetic Carbon Materials as Supercapacitors, 23rd Biennial Conference on Carbon, State College PA, July 1997, invited.
40. Sol-Gel Derived Activated Carbon as a Potential Gas Phase Adsorbent, 23rd Biennial Conference on Carbon, State College PA, July 1997, invited.

39. Novel Sol-Gel Derived Controlled-Pore and Property Adsorbent Materials, AIChE Annual Meeting, Chicago, IL, November 1996, contributed.
38. Periodic State Heat Effects in Pressure Swing Adsorption-Solvent Vapor Recovery Processes, AIChE Annual Meeting, Chicago, IL, November 1996, invited.
37. Mathematical Modeling of Sol-Gel Derived Carbon Xerogels as Double Layer Capacitors, 190th Meeting of The Electrochemical Society Inc., San Antonio, TX, October, 1996, contributed.
36. Feasibility and Limitations of Nanolevel High Gradient Magnetic Separation, Emerging Technologies in Hazardous Waste Management VIII, Birmingham, AL, September, 1996, invited.
35. Parametric Study of a Commercial Pressure Swing Adsorption-Solvent Vapor Recovery Process, 5th World Congress of Chemical Engineering, San Diego, CA, July, 1996, invited.
34. The Effect of Preparation and Aging on the Structure of Mixed-Metal Oxide-Silica Xerogels, 5th World Congress of Chemical Engineering, San Diego, CA, July, 1996, contributed.
33. Magnetically-Enhanced Adsorption of Inorganic Pollutants from Water, 5th World Congress of Chemical Engineering, San Diego, CA, July, 1996, invited.
32. Parametric Study of a Commercial Pressure Swing Adsorption-Solvent Vapor Recovery Process, Carbon Materials for the Environment, American Carbon Society Workshop, Charleston, SC, June, 1996, contributed.
31. Synthesis and Characterization of Novel Carbon Xerogels, Carbon Materials for the Environment, American Carbon Society Workshop, Charleston, SC, June, 1996, contributed.
30. Novel Controlled Pore and Property Materials: Sol-Gel Derived Xerogels and Aerogels, 211th ACS National Meeting, New Orleans, LA, March 1996, contributed.
29. Adsorption of Metals from Aqueous Solutions Using a Magnetic Adsorbent in the Presence of a Magnetic Field," 211th ACS National Meeting, New Orleans, LA, March 1996, contributed.
28. Synthesis of SiO_2-Al_2O_3 Xerogels: Effect of Calcination on the Surface Area, Pore Volume, and Pore Structure, AIChE Annual Meeting, Miami Beach, FL, November 1995, contributed.
27. Parametric Study on the PSA-Solvent Vapor Recovery Process, AIChE Annual Meeting, Miami Beach, FL, November 1995, contributed.
26. Magnetically-Enhanced Adsorption of Metals from Aqueous Solutions, Ninth Symposium on Separation Science and Technology for Energy Applications, Gatlinburg, TN, October 1995, contributed.
25. Transient Heat Effects in Pressure Swing Adsorption-Solvent Vapor Recovery Systems, Ninth Symposium on Separation Science and Technology for Energy Applications, Gatlinburg, TN, October 1995, contributed.
24. Magnetically Enhanced Adsorption of Inorganic Pollutants from Water, Emerging Technologies in Hazardous Waste Management VII, Atlanta, GA, September 1995, invited.
23. Waste Minimization Methods for Treating Analytical Instrumentation Effluents at the Source, Emerging Technologies in Hazardous Waste Management VII, Atlanta, GA, September 1995, contributed.
22. A Bench-Scale Study of a One-Step Dissolution Process for Treating Contaminated

Fiberglass Filters, Emerging Technologies in Hazardous Waste Management VII, Atlanta, GA, September 1995, contributed.

21. Adsorption Characteristics of Carbon-Containing and Carbon Fiber Fabrics, Fifth International Conference on Fundamentals of Adsorption, Pacific Grove, CA, May, 1995, contributed.
20. Synthesis and Characterization of Porous Oxide Gels as Novel Adsorbent Materials, Fifth International Conference on Fundamentals of Adsorption, Pacific Grove, CA, May, 1995, contributed.
19. Magnetic Swing Adsorption Process for Actinide and Heavy Metal Removal From Waste Water, Waste Management '95 Symposia, Tucson, AZ, February, 1995, contributed.
18. Concentration and Recovery of Solvent Vapors by Pressure Swing Adsorption, AIChE Annual Meeting, San Francisco, CA, November, 1994, contributed.
17. Solvent Vapor Recovery by Pressure Swing Adsorption, Emerging Technologies in Hazardous Waste Management VI, Atlanta, GA, September 1994, contributed.
16. Vacuum Swing Adsorption for Solvent Vapor Recovery, AIChE Summer National Meeting, Denver, CO, August, 1994, contributed.
15. Correlation of Azeotropic Data with Model for Laterally Interacting Adsorbed Gas Mixtures on Heterogeneous Surfaces, AIChE Annual Meeting, St. Louis, MO, November 1993, contributed.
14. Dissolution of Fiberglass Filters: A Treatment Method for Hazardous and Mixed Wastes, Emerging Technologies in Hazardous Waste Management V, Atlanta, GA, September 1993, contributed.
13. Vitrification as a Viable Means of Treating Mixed Waste, AIChE Summer National Meeting, Seattle, WA, August 1993, contributed.
12. Development of a Nitric/Formic Acid Process to Reduce Hydrogen Emissions During Sludge Treatment in the DWPF, Waste Management '93 Symposia, Tucson, AZ, February 1993, invited.
11. Adsorption of a Binary Gas Mixture which Laterally Interacts on a Random Heterogeneous Surface, AIChE Annual Meeting, Miami Beach, FL, November 1992, contributed.
10. Study on Hydrogen Evolution During Treatment of SRS High-Level Radioactive Sludge Simulant with Formic Acid, AIChE Summer National Meeting, Minneapolis, MN, August 1992, contributed.
9. Hydrogen Generation During Treatment of Simulated High-Level Radioactive Waste with Formic Acid, 1992 International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 1992, contributed.
8. Pilot Scale Processing of Simulated Savannah River Site High-Level Radioactive Waste, 1991 Joint International Waste Management Conference, Seoul, Korea, October 1991, invited.
7. Immobilization of Simulated High-Level Radioactive Waste in Borosilicate Glass: Pilot Scale Demonstrations, Fifth International Symposium on Ceramics in Nuclear Waste Management, Amer. Cer. Soc. Annual Conference, Cincinnati, OH, April 1991, invited.
6. High-Level Radioactive Waste Vitrification Technology and Its Applicability to Industrial Waste Sludges, Second International Conference on Waste Management in the Petrochemical Industries-Toxics Management, New Orleans, LA, June 1991, contributed.
5. Removal of Mercury from Waste Water: Large Scale Performance of an Ion Exchange Process, Second International Conference on Waste Management in the Petrochemical Industries-Toxics Management, New Orleans, LA, June 1991, contributed.

4. The Processing of Simulated High-Level Radioactive Waste Sludges Containing Nitrites and Mercury, 1991 International High Level Radioactive Waste Management Conference, Las Vegas, NV, May 1991, contributed.
3. The Effects of Hysteresis on Transition Types in Fixed Bed Desorption, AIChE Annual Meeting, Chicago, IL, November 1990, contributed.
2. Air Purification by Pressure Swing Adsorption: Transient and Cyclic Steady-State Behavior, AIChE Annual Meeting, Chicago, IL, November 1990, contributed.
1. Air Purification and Solvent Concentration by Pressure Swing Adsorption, AIChE Special Meeting: First Topical Conference on Pollution Prevention for the 1990's, Washington, D.C., December 1989, invited.

INVITED SEMINARS

1. "Adsorption with Lateral Interactions on Heterogeneous Surfaces," Physics Department, South Dakota School of Mines and Technology, Rapid City, SD, December, 1991.
2. "Hydrogen Generation during High Level Radioactive Waste Treatment with Formic Acid", Department of Chemical Engineering, Cleveland State University, Cleveland, OH, March 1992.
3. "Hydrogen Generation during High Level Radioactive Waste Treatment with Formic Acid", Department of Chemical Engineering, University of Missouri-Columbia, Columbia, MO, November 1992.
4. "Steam Stripping Organics from Water: Unsteady-State Modeling Study", Department of Chemical Engineering and Materials Science, University of Oklahoma, Norman, OK, March 1993.
5. "Model for Laterally Interacting Adsorbed Gas Mixtures on Heterogeneous Surfaces", Department of Chemical Engineering, University of South Carolina, Columbia, SC, April 1993.
6. "Solvent Vapor Recovery by Pressure Swing Adsorption", The BOC Group Technical Center, Murray Hill, NJ, June 1997.
7. "New Field Enhanced Separation Processes for the Removal of Metal Species from Aqueous Solutions," New Mexico State University, Las Cruces, NM, February 1998.
8. "Adsorption Process Research for Separation and Purification", University of Texas at Austin, Austin, TX, October 1998.
9. "Nanolevel High Gradient Magnetic Separation," Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID, May 1999.
10. "Equilibrium Theory Analyses of Novel Pressure Swing Adsorption Cycles for High Heavy Component Enrichment," Kumamoto University, Kumamoto, Japan, May 2001.
11. "Hydrogen Storage, A Roadblock to the Hydrogen Economy," Clemson University, Clemson, SC, April 2002.
12. "What Can Possibly Be Exciting and New About Pressure Swing Adsorption," Universidade Federal Do Ceara, Fortaleza, Brazil, May 2002.
13. "Quest for a Viable Hydrogen Storage Material for Automotive Applications," University of Florida, Gainesville, Florida, December 2003.
14. "Is Hydrogen Storage Truly a Roadblock to the Hydrogen Economy?" Purdue University West Lafayette, Indiana, March 2004.
15. "Complex Hydrides for Hydrogen Storage," Cooperate Research Department, General Electric, Schenectady, New York, April 20, 2004.

16. "Complex Hydride H_2 Storage Materials, Metal Hydride H_2 Storage Vessels, and PSA H_2 Purification Systems," Plug Power, May 2004.
17. "Pressure Swing Adsorption (PSA) Technology: Overview and New Developments," ExxonMobil, May 2004.
18. "Hydrides for Hydrogen Storage and Delivery," Air Products and Chemicals, July 2004.
19. "Carbon Dioxide Sequestration and Adsorbents," Air Products and Chemicals, July 2004.
20. "Metal and Complex Hydride Hydrogen Storage Systems," Air Products and Chemicals, July 2004.
21. "Modeling the Charge and Discharge Behavior of Metal Hydride H_2 Storage Systems," Teleconference Seminar Series, USC and the Fraunhofer Institute, Germany, December 2005.
22. "Adsorption Process Research at USC: Past, Present and Future," Praxair Technology Center, Tonawanda, New York, January 6, 2006.
23. "Adsorption Process Research at USC: Past, Present and Future," SeQaul Technologies, San Diego, CA, April 9, 2006.
24. "Metal hydride H_2 Storage Systems Modeling Using Multiphysics," COMSOL and USC Reaction Engineering Workshop, Columbia, SC, June 1, 2006.
25. "Adsorption Process Research at USC: Past, Present and Future," Atlas Copco, Belgium, September 7, 2006.
26. "Magnetic Drug Targeting," Commercializing USC Engineering technologies: Putting USC Discoveries into the Marketplace, Columbia, SC November 3, 2006.
27. "Activated Carbon with Biological Activity and its Applications, MeadWestvaco, Charleston, SC, February 26, 2007.
28. "Metal Hydride Hydrogen Storage Vessel Design," Millennium Cell, Eatontown, NJ, April 16, 2007.
29. "Research for Energy and the Environment: What One Group of Chemical Engineers is Doing," SC Junior Academy of Sciences, Columbia, SC, February, 2008.
30. "Adsorption Process Research at USC," Eastman Chemical Company, Kingsport, TN, August 14, 2008.
31. "Is Hydrogen Storage Still a Roadblock to the Hydrogen Economy?" Department of Chemical and Bimolecular Engineering, Tulane University, March 6, 2009.
32. "Is Hydrogen Storage Still a Roadblock to the Hydrogen Economy?" Department of Chemical and Biological Engineering, University of Alabama at Tuscaloosa, June 22, 2009.
33. "Overview: Pressure Swing Adsorption Research at USC," W. R. Grace, Columbia, MD, February 18, 2010.
34. "Gas Separation by Pressure Swing Adsorption: Recent Developments and Applications," Pacific Northwest National Laboratory, Richland, WA, March 11, 2010.
35. "CO_2 Capture from Coal Fired Power Plants by Pressure Swing Adsorption," University of South Carolina, December 1, 2011.
36. "Compact Adsorption Systems for Extracting EVA Oxygen from Spacecraft and Habitat Air," NASA MSFC, Huntsville, AL, February 5, 2013.
37. "Recent Advances in Pressure Swing Adsorption Technology," Air Liquide, Newark, DE, February 15, 2013.
38. "Hydrogen Storage Systems and Materials" Air Liquide, Newark, DE, February 15, 2013.
39. "Implant Assisted-Magnetic Drug Targeting," Air Liquide, Newark, DE, February 15, 2013.
40. "Adsorption and Diffusion of Gases in Microporous Adsorbents Using Volumetric

Frequency Response," Quantachrome, Boynton Beach, FL, February 27, 2013.
41. "Pressure Swing Adsorption: A Ubiquitous Gas Separation Technology," Savannah River National Laboratory/AIChE Central Savannah River Section, Aiken, SC, January 23, 2014.
42. "Pressure Swing Adsorption: A Ubiquitous Gas Separation Technology," AIChE Live Webinar, Columbia, SC, August 6, 2014.
43. "On the Heavy Reflux Concept in Pressure Swing Adsorption Processes," NASA Teleconference Seminar, Columbia, SC, January 20, 2016.
44. "Pressure Swing Adsorption: A Ubiquitous Gas Separation Technology," Department of Chemical and Materials Engineering, University of Kentucky, Lexington, KY, September 6, 2017.
45. "Pressure Swing Adsorption: A Ubiquitous Gas Separation Technology," Department of Chemical and Materials Engineering, Auburn University, Auburn, AL, February 28, 2018.
46. "Pressure Swing Adsorption: A Ubiquitous Gas Separation Technology," Energy Safety Research Institute, Swansea University Bay Campus. Swansea, Wales, UK, March 2018.

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1. Liu, Y.; Ritter, J. A.; Holland, C. E.; Al-Muhtaseb, S. A. "Pressure Swing Adsorption Simulator." © *The University of South Carolina,* **2000**.
2. Al-Muhtaseb, S. A.; Ritter, J. A.; Holland, C. E. "Pressure Swing Adsorption Performance and Training Calculator (PSACalc-1A)." © *The University of South Carolina,* **2000**.
3. Ritter, J. A.; McIntyre, J. A.; Ebner, A. D.; Al-Muhtaseb, S. A.; Holland, C. E. "Stripping and Enriching Reflux Pressure Swing Adsorption Process for High Enrichment and Recovery of Dilute Hydrocarbons." © *The University of South Carolina,* **2001**.
4. Al-Muhtaseb, S. A.; Ritter, J. A.; Holland, C. E. "PSA Performance and Operating Condition Calculator for Single Adsorbable Components Using the Equilibrium Theory Model." © *The University of South Carolina,* **2001**.
5. Al-Muhtaseb, S. A.; Danielle, K. D.; Ritter, J. A.; Holland, C. E. "Pressure Swing Adsorption Design and Training Calculator for Gas Purification Processes with Unfavorable Adsorption Isotherms." © *The University of South Carolina,* **2001**.
6. Ritter, J. A.; Holland, C. E.; White, R. E. "LabView Control Software for the Feedback Process Control Rig." © *The University of South Carolina,* **2001**.
7. Ritter, J. A.; Holland, C. E.; Ebner, A. D. "Custom LabView Software for Brinkman Auto Titration Systems." © *The University of South Carolina,* **2001**.
8. Ritter, J. A.; White, R. E., Weidner, J. W.; Holland, C. E.; "Pulsed Current Analysis Software for Hybrid Battery and Capacitor Systems." © *The University of South Carolina,* **2001**.
9. Ritter, J. A.; Gadre, S. A.; Ebner, A. D.; Holland, C. E. "Metal Hydride Hydrogen Storage System Performance Evaluator" © *The University of South Carolina,* **2003**.

HONORS AND AWARDS

Editorship

Associate Editor, *Adsorption, Journal of the International Adsorption Society*, January 2021 to present.

Editorial Boards

Industrial and Engineering Chemistry Research, January 2009 to December 2011.
Recent Patents on Chemical Engineering, July 2007 to December 2010.
Adsorption, Journal of the International Adsorption Society, September 1999 to December 2018.
Separation Science and Technology, January 1998 to present.

Fellows

Fellow of the American Chemical Society, July 2012.
Fellow of the American Institute of Chemical Engineers, June 2013.

Awards

Inducted into the Activated Carbon Hall-of-Fame, 42nd International Activated Carbon Conference, September 2018.
Recipient of the AIChE Institute Award for Excellence in Industrial Gases Technology, November, 2016.
Recipient of the 2012 USC Educational Foundation Research Award for Science, Mathematics, and Engineering, USC, May 2012.
Best Poster Award: AIChE 2008 Annual Meeting, Philadelphia, PA, November, 2008 (S. Bhadra, C. H. Holland, M. A. Nicholson, A. D. Ebner, F. Jegede and J. A. Ritter, "Production of Ammonia with Pressure Swing Adsorption Utilized in Key Separations Steps").
Best Poster Award: AIChE 2005 Annual Meeting, Cincinnati, OH, November, 2005 (M. O. Aviles, A. D. Ebner and J. A. Ritter, "In Vitro Studies of Ferromagnetic Coils for Implant Assisted Magnetic Drug Targeting").
Best Poster Award: 8th International Conference on Fundamentals of Adsorption FOA8, Sedona, AR, May, 2004 (S. A. Gadre, A. D. Ebner and J. A. Ritter, "Two and Three Dimensional Models for the Design of Metal Hydride Hydrogen Storage Systems").
Recipient of the 1999 College of Engineering Research Achievement Award, USC, May 1999.
Recipient of the National Science Foundation Research Initiation Award, July 1994.
Recipient of the Department of Mathematics Outstanding Achievement Award, Onondaga Community College, June 1980.

Other Accolades

Invited Co-Lead of the Focus Area "Intensified Process Fundamentals" within the New DOE/EERE Manufacturing Innovation Institute: Rapid Advancement in Process Intensification Deployment (RAPID), initiated April 1, 2017.
Invited Co-Author: M. D. LeVan, G. Carta, J. A. Ritter and K. S. Walton, "Adsorption and Ion Exchange," in Perry's Chemical Engineers' Handbook, 9th Ed., (D. W. Green and R. H. Perry, eds.), McGraw-Hill, NY (2018).
Elected to the Board of Directors of the International Adsorption Society, May 2007 (6 yr term).
Invited Co-Principal Investigator in the Separations Research Program at the University of Texas at Austin, June 1998 to present.
Listed in *Who's Who Among America's Teachers, 4th and 5th editions.*
Sigma Xi, nominated June 1993, initiated March 1994.

Cum Laude Graduate, B.S. Chemical Engineering, SUNY Buffalo, June 1983.
Tau Beta Pi, nominated and life-time member since March 1982.
Honors Graduate, A.A. Mathematics/Science, Onondaga Community College, June 1980.

PROFESSIONAL AND SERVICE ACTIVITIES

Technical Reviewer: Funding Agencies

American Association for the Advancement of Science
American Chemical Society Petroleum Research Fund
Belgium
Canada
Department of Defense
Department of Energy
Environmental Protection Agency
Kuwait
Louisiana Board of Regents
NASA
National Research Council
National Science Foundation
Netherlands
Portugal
Romania
Qatar
The National Academies
US Civilian Research and Development Foundation

Technical Reviewer: Journals

AIChE Journal
Adsorption
Adsorption Science and Technology
Advanced Materials
Advanced Functional Materials
Advances in Environmental Research
Applied Catalysis B: Environmental
Applied Physics Letters
Applied Surface Science
Biophysical Journal
Carbon
Catalysis Today
Chemical Engineering Science
Chemical Engineering Communications
Chemistry, A European Journal
Chemistry of Materials
Computers and Chemical Engineering
Colloids and Surfaces A: Physicochemical and Engineering Aspects

Environmental Progress
Environmental Science and Technology
Industrial and Engineering Chemistry Research
International Journal of Hydrogen Energy
International Journal of Pharmaceutics
Journal of Alloys and Compounds
Journal of Aerosol Science
Journal of the America Chemical Society
Journal of Chemical and Engineering Data
Journal of Colloid and Interface Science
Journal of the Electrochemical Society
Journal of Magnetism and Magnetic Materials
Journal of Materials Science
Journal of Non-Crystalline Solids
Journal of Physical Chemistry B
Journal of Porous Media
Journal of Power Sources
Journal of Sol-Gel Science and Technology
Journal of Solid State Chemistry
Langmuir
Medical Physics
Microporous and Mesoporous Materials
Physics in Medicine and Biology
Separation Science and Technology
Separation and Purification Technology
Science

International Adsorption Society (IAS)

Board of Directors, 5/07 to 4/13.

American Institute of Chemical Engineers (AIChE)

Director, Separations Division of the AIChE, 1/08 to 12/11.
Past Chair, Separations Division of the AIChE, 1/07 to 12/07.
Chair, Separations Division of the AIChE, 1/06 to 12/06.
Vice Chair, Separations Division of the AIChE, 1/05 to 12/05.
Second Vice Chair, Separations Division of the AIChE, 1/04 to 12/04.
Director, Separations Division of the AIChE, 1/00 to 12/03.
National Programming Committee Member, AIChE, 1/98 to 12/99.
National Officer, Area Chair, Adsorption and Ion Exchange Sub-Committee of the Separations Division of the AIChE, 1/98 to 12/99.
National Officer, Vice-Area Chair, Adsorption and Ion Exchange Sub-Committee of the Separations Division of the AIChE, 1/96 to 12/97.
Programming Committee Member, Symposia Organizer, Ceramics Sub-Committee of the Materials Engineering and Sciences Division of the AIChE, 11/94 to present.
Programming Committee Member, Symposia Organizer, Adsorption and Ion Exchange Sub-

Committee of the Separations Division of the AIChE, 11/90 to present.
Local Section Officer: Palmetto, September 1993 to December 1999.
Local Section Officer: Savannah River, June 1992 to May 1993.

American Chemical Society (ACS)

Chair, Industrial & Engineering Chemistry Division of the ACS, 1/14-12/14.
Chair-elect, Industrial & Engineering Chemistry Division of the ACS, 1/13-12/13.
National Programming Committee Member, Symposia Organizer, Separations Sub-Division of the Industrial & Engineering Chemistry Division of the ACS, 11/94 to 12/02.
Past Chair, Separations Sub-Division of the Industrial & Engineering Chemistry Division of the ACS, 1/02-12/02.
Chair, Separations Sub-Division of the Industrial & Engineering Chemistry Division of the ACS, 1/01-12/01.
Chair Elect, Separations Sub-Division of the Industrial & Engineering Chemistry Division of the ACS, 1/00-12/00.
Vice-Chair Elect, Separations Sub-Division of the Industrial & Engineering Chemistry Division of the ACS, 1/99-12/99.
National Organizing Committee Member, Pollution Prevention Sub-Division of the Industrial & Engineering Chemistry Division of the ACS, 1/94 to 12/96.
Secretary, Pollution Prevention Sub-Division of the Industrial & Engineering Chemistry Division of the ACS, 8/94 to 7/97.

FUNDED RESEARCH GRANTS

Current Funding

121. Micron, "Evaluation of a Ni Adsorbent for O_2 Removal," $100,000, January 1, 2021 to June 30, 2021, J. A. Ritter (PI).
120. ColdStream Energy, "Evaluation of Carbons for Hydrocarbon Adsorption," $275,000, July 1, 2020 to December 31, 2021, J. A. Ritter (PI) and A. D. Ebner.
119. DOE/NETL, "Transformational Molecular Layer Deposition, Tailor-made Size-Sieving Sorbents for Post-Combustion CO_2 Capture," $3,000,000, October 1, 2019 to September 30, 2022, M. Yu (RPI), J. A. Ritter (USC), S. Li (GTI), A. Sexton (Trimeric Corp.) and F. C. Morton (NCCC) ($950,000 for JAR).
118. W. L. Gore & Associates, "Structured Adsorbent Material Testing and Evaluation," $672,000, March 1, 2019 to February 28, 2022, J. A. Ritter (PI) and A. D. Ebner.
117. RAPID/AIChE/DOE, "Microfibrous Entrapped Adsorbents for High Throughput Modular Process Intensified Gas Separation and Ion Exchange," $3,650,000, January 1, 2018 to September 30, 2021, P. Dimick (IntraMicron), J. A. Ritter (USC), B. Calloway (SRNL), B. Tatarchuk (Auburn U) and B. Paul (Oregon State U) ($1,050,000 for JAR).
116. RAPID/AIChE/DOE, "Roadmap Development for RAPID: Intensified Process Fundamentals," $375,000, April 1, 2017 to September 30, 2022, J. A. Ritter (PI).

Past Funding

115. Samsung, "Technical Feasibility Evaluation of Adsorption Based Heat Pump Technology

for Applications in Clothes Dryer and Air Conditioner," $63,352, August 1, 2020 to November 30, 2020, J. A. Ritter (PI) and A. D. Ebner.

114. NASA MSFC/Jacobs Engineering, "Development of a TSA Process for CO_2 Removal Using a Structured 13X Adsorbent," $492,269, November 29, 2016 to November 23, 2020, J. A. Ritter (PI) and A. D. Ebner.
113. Apache Corporation, "Carbon Adsorbent Material and PSA Cycle Testing for Natural Gas Processing," $170,000, June 1, 2019 to December 31, 2019, J. A. Ritter (PI) and A.D. Ebner.
112. Apache Corporation, "PSA Cycle Testing for Natural Gas Processing," $140,000, September 1, 2017 to December 31, 2018, J. A. Ritter (PI) and A.D. Ebner.
111. Apache Corporation, "Carbon Adsorbent Material Testing for Natural Gas Processing," $60,000, September 1, 2017 to December 31, 2018, J. A. Ritter (PI) and A. D. Ebner.
110. Apache Corporation, "Characterization of Carbon Adsorbent Materials," $100,000, April 1, 2017 to December 31, 2017, J. A. Ritter (PI) and A. D. Ebner.
109. Shell, "Separation Process Proof-of-Concept: Experimental Campaign in Six-Bed PSA Unit," $120,000, April 1, 2017 to October 31, 2017, J. A. Ritter (PI) and Armin D. Ebner.
108. DOE/NEUP, "Experimental Determination and Modeling of Used Fuel Drying by Vacuum and Gas Circulation for Dry Cask Storage," $4,000,000, October 1, 2014 to September 30, 2017, T.W. Knight (PI, USC), J. Khan (USC), T. Farouk (USC), J. Tarbutton (USC), J. A. Ritter (USC), E. Roberts (USC), J. S. Tulenko (UF), M. Danjaji (SCSU), W. Bracey (Areva) and J. Kirkland (Areva) ($305,879 for JAR).
107. Shell, "Evaluation of Na-ETS-10 using Dynamic and Equilibrium Adsorption and Desorption Techniques," $60,000, July 1, 2016 to December 31, 2016, J. A. Ritter (PI) and Armin D. Ebner.
106. Process Science and Technology Center, University of Texas at Austin, "Fundamental Study of a Rapid Pressure Swing Adsorption Process," $25,000, January 1, 2016 to December 31, 2016, J. A. Ritter (PI).
105. NASA MSFC, "New PSA Cycle for CO_2 Removal and Concentration During Closed-Loop Human Space Exploration Missions," $150,000, October 15, 2015 to September 30, 2016, J. A. Ritter (PI) and A. D. Ebner.
104. Apache Corporation, "Construction and Testing of Pressure Swing Adsorption Systems and Materials Characterization for CH_4 and CO_2 Separation," $90,000, October 1, 2015 to December 31, 2016, J. A. Ritter (PI) and Armin D. Ebner.
103. Shell, "Pressure Swing Adsorption Process Validation: Fixed Bed Experimentation," $50,000, June 1, 2015 to June 30, 2016, J. A. Ritter (PI) and A. D. Ebner.
102. Apache Corporation, "Evaluation of CH_4 and CO_2 Separation in a Multi-Bed Pressure Swing Adsorption System," $85,000, December 1, 2014 to December 31, 2015, J. A. Ritter (PI) and Armin D. Ebner.
101. DK Engineering Consulting, "Pressure Swing Adsorption Process Development for Removal of Toluene and Epichlorohydrin Vapors from Nitrogen," $90,000, June 15, 2015 to December 15, 2015, J. A. Ritter (PI).
100. Apache Corporation, "Evaluation of CO_2 Adsorbents using Gravimetric and Volumetric Adsorption Techniques," $80,000, May 15, 2014 to December 31, 2015, J. A. Ritter (PI) and Armin D. Ebner.
99. NASA MSFC/Jacobs Engineering, "Novel Pressure Swing Adsorption (PSA) Cycle to Facilitate Heavy Component (CO_2) Enrichment and Recovery," $175,000, March 15, 2015 to September 30, 2015, J. A. Ritter (PI) and A. D. Ebner.

98. DOE/NETL, "Bench-Scale Development and Testing of Rapid PSA for CO_2 Capture," $2,100,000, May 1, 2012 to September 30, 2015, D. G. Ward (W. R. Grace), J. A. Ritter (USC), B. Chadwell (Battelle) and W. A. Whittenberger (Catacel) ($1,100,000 for JAR).
97. Process Science and Technology Center/Chevron, University of Texas at Austin, "Fundamental Study of a Rapid Pressure Swing Adsorption Process," $75,000, January 1, 2012 to December 31, 2015, J. A. Ritter (PI).
96. Center for Strategic Approaches to the Generation of Electricity (SAGE) at USC, "New Pressure Swing Adsorption Cycles for CO_2 Capture from Coal Fired Power Plants," $291,636, September 1, 2008 to February 28, 2016, J. A. Ritter (PI) and A. D. Ebner.
95. Process Science and Technology Center/ExxonMobil, University of Texas at Austin, "Hybrid Distillation-Pressure Swing Adsorption Processes," $150,000, September 1, 2008 to December 31, 2011, J. A. Ritter (PI).
94. SC EPSCoR, "Development of Rapid Cycle Pressure Swing Adsorption Oxygen Concentrators for Extraterrestrial Applications," $125,642, October 1, 2009 to September 30, 2013, J. A. Ritter (PI).
93. NASA EPSCoR, "Development of Rapid Cycle Pressure Swing Adsorption Oxygen Concentrators for Extraterrestrial Applications," $750,000, October 1, 2009 to September 30, 2013, J. A. Ritter (PI), M. D. LeVan (Vanderbilt), and P. Edwards (SeQual).
92. SC Space Grant Consortium and SC EPSCoR, "Compact Adsorption Systems for Extracting EVA Oxygen from Spacecraft and Habitat Air," $55,129, May 1, 2012 to April 30, 2013, J. A. Ritter (PI).
91. National Space Biomedical Research Institute, "Development of Pressure Swing Adsorption Technology for Spaceflight Medical Oxygen Concentrators," $1,800,000, September 1, 2009 to August 31, 2013, J. A. Ritter (PI), M. D. LeVan (Vanderbilt), P. Edwards (SeQual) and J. C. Knox (NASA MSFC).
90. National Science Foundation, "Complex Hydrides of Lithium, Aluminum and Boron for Hydrogen Storage," $300,000, September 1, 2009 to August 31, 2012, J. A. Ritter (PI) and Armin D. Ebner.
89. W. R. Grace, "Adsorbent Evaluation with Volumetric Frequency Response," $189,666, J. A. Ritter (PI) and Armin D. Ebner, September 1, 2010 to May 31, 2012.
88. INGENCO Distributed Energy, LLC, "Adsorbent Evaluation Using Thermogravimetric Cycling Analysis," $60,000, April 11, 2011 to October 10, 2011, J. A. Ritter (PI) and A. D. Ebner.
87. SmartKoncept Technology Inc. and DOE, "Integrated Ammonia Reactor and Ammonia Pressure Swing Adsorption Recovery, $79,690, October 1, 2010 to September 30, 2011, J. A. Ritter (PI) and A. D. Ebner.
86. SeQaul Technologies and DARPA, "Pressure Swing Adsorption Cycle Modeling for Medical Oxygen Concentrators" $330,000, April 28, 2009 to August 28, 2011, J. A. Ritter (PI) and A. D. Ebner.85.
85. SmartKoncept Technology Inc. and DOE, "Ammonia Process by Pressure Swing Adsorption, $341,570, October 1, 2007 to September 30, 2010, J. A. Ritter (PI) and A. D. Ebner.
84. Pacific Northwest National Laboratory, "Development of New Adsorption Cycles for Xenon Concentration from Air," $50,000, June 2, 2009 to November 30, 2009, J. A. Ritter (PI) and A. D. Ebner.
83. NASA MSFC, "Analysis of Engineered Structured Sorbent Systems for the Next Generation Atmosphere Revitalization System," $60,000, March 15, 2009 to March 14,

2010, J. A. Ritter (PI) and A. D. Ebner.

82. SC Space Grant Consortium and SC NASA EPSCoR, "Development of an Adsorption Process Simulator in Support of NASA Space Craft, Lunar and Martian Missions," $84,800, May 1, 2008 to April 30, 2010, J. A. Ritter (PI).
81. Studsvik Development, Inc., "Carbon Monoxide Isotope Separation by Pressure Swing Adsorption," $65,000, August 1, 2008 to January 31, 2009, J. A. Ritter (PI) and A. D. Ebner.
80. NASA MSFC, "Evaluation of Medical Oxygen PSA Technology for International Space Station Applications," February 4, 2008 to February 3, 2009, $150,000, J. A. Ritter (PI) and A. D. Ebner.
79. Intelligent Energy Inc. and DOE, "Development of a Process Simulator for Adsorption Enhanced Reforming/Pressure Swing Reformer," $75,000, October 15, 2007 to July 31, 2008, J. A. Ritter (PI) and A. D. Ebner.
78. NSF I/UCRC for Fuel Cell Research, "Design of Metal and Complex Hydride Hydrogen Storage Systems," $10,000, January 1, 2008 to March 31, 2008, J. A. Ritter (Project PI, co-PI of Center).
77. DOE, "Clean Energy Research II," $1,984,000, December 1, 2005 to June 30, 2008, R. E. White (PI), J. A. Ritter, M. A. Matthews, J. W. Weidner, J. Van Zee and J. Delhomelle ($250,000 for JAR).
76. DOE NETL, "New Adsorption Cycles for Carbon Dioxide Capture and Concentration," $200,000, August 1, 2005 to July 31, 2008, J. A. Ritter (PI) and A. D. Ebner.
75. SeQaul Technologies, Inc., "Fellowship for Cyclic Adsorption Process Research," $3,000, February 1, 2007 to December 31, 2007, J. A. Ritter (PI).
74. NSF I/UCRC for Fuel Cell Research, "Design of Metal and Complex Hydride Hydrogen Storage Systems," $48,000, January 1, 2007 to December 31, 2007, J. A. Ritter (Project PI, co-PI of Center).
73. MeadWestvaco Charleston Research Center, "Graduate Student Fellowship to Study Cyclic Adsorption Processes," $30,000, January 1, 2007 to December 31, 2007, J. A. Ritter (PI).
72. NASA MSFC, "Design of an Adsorption-Based Carbon Dioxide, Humidity and Trace Contaminant Removal System," June 3, 2005 to December 31, 2007, $322,747, J. A. Ritter (PI) and A. D. Ebner.
71. PRF ACS, "Early and Late Bimetallic Transition Metal Catalysis on Co-Doped $NaA1H_4$," $80,000, September 1, 2005 to August 31, 2007, J A. Ritter (PI).
70. NSF, "NER: Ferromagnetic Seeding for Noninvasive Magnetic Drug Targeting," $121,550, June 15, 2005, May 31, 2007, J. A. Ritter (PI) and A. D. Ebner.
69. NSF I/UCRC for Fuel Cell Research, "Design of Metal and Complex Hydride Hydrogen Storage Systems," $48,000, January 1, 2006 to December 31, 2006, J. A. Ritter (Project PI, co-PI of Center).
68. MeadWestvaco Charleston Research Center, "Graduate Student Fellowship to Study Cyclic Adsorption Processes," $30,000, January 1, 2006 to December 31, 2006, J. A. Ritter (PI).
67. NASA MSFC, "Development of an Adsorption Process Simulator for Extraterrestrial Applications," $20,000, April 12, 2004 to April 11, 2006, J. A. Ritter (PI).
66. NSF I/UCRC for Fuel Cell Research, "Design of Metal and Complex Hydride Hydrogen Storage Systems," $48,000, January 1, 2005 to December 31, 2005, J. A. Ritter (Project PI, co-PI of Center).
65. MeadWestvaco Charleston Research Center, "Graduate Student Fellowship to Study Cyclic Adsorption Processes," $30,000, January 1, 2005 to December 31, 2005, J. A. Ritter (PI).

64. DOE/WSRC/SCUREF, "Heat Transfer and Modeling of Next Generation Metal Hydride Beds," $45,868, July 1, 2004 to August 31, 2005, J. A. Ritter (PI) and A. D. Ebner.
63. SC Space Grant Consortium, "Development of Robust Process Simulators for NASA Adsorption Technology," $6,000, July 1, 2004 to June 30, 2005, J. A. Ritter (PI).
62. USC NanoCenter, "On the Development of Ferromagnetic Nano-Dockers for Magnetic Drug Targeting in the Body," $20,000, March 15, 2004 to March 14, 2005, J. A. Ritter (PI).
61. DOE, "Clean Energy Research," $2,100,000, July 1, 2004 to December 31, 2005, R. E. White (PI), J. A. Ritter, M. A. Matthews, J. W. Weidner and J. Van Zee ($335,000 for JAR).
60. DOE/WSRC/SCUREF, "EDS Modeling Collaboration," $50,180, January 12, 2003 to September 30, 2004, E. P. Gatzke (PI), J. A. Ritter, P. B. Balbuena , and F. Gadala-Maria ($12,500 for JAR).
59. University of Chicago, "Targeted Drug Delivery Research Fund," $40,000, January 1, 2004 to December 31, 2005, J. A. Ritter (PI).
58. MeadWestvaco Charleston Research Center, "Graduate Student Fellowship to Study Cyclic Adsorption Processes," $30,000, January 1, 2004 to December 31, 2004, J. A. Ritter (PI).
57. NSF I/UCRC for Fuel Cell Research, "Design of Metal and Complex Hydride Hydrogen Storage Systems," $31,500, January 1, 2004 to December 31, 2004, J. A. Ritter (Project PI, co-PI of Center).
56. DOE/WSRC/SCUREF, "High Capacity Complexes for Hydrogen Storage II," $22,710, July 12, 2003 to September 30, 2003, J. A. Ritter (PI), A. D. Ebner and C. T. Williams.
55. DOE NETL, "Radically New Adsorption Cycles for Carbon Dioxide Sequestration," $50,000, September 1, 2003 to February 28, 2005, J. A. Ritter (PI) and A. D. Ebner.
54. DOE/WSRC/SCUREF, "Heat Transfer and Modeling of Next Generation Metal Hydride Beds," $35,129, August 12, 2003 to September 30, 2003, J. A. Ritter (PI) and A. D. Ebner.
53. SC BRIN, "Synthesis and Characterization of Nanostructured Materials for Hydrogen Storage," $109,680, May 16, 2003 to August 31, 2004, J. A. Ritter (PI) and R. Massoudi.
52. Army Research Office, "Hybrid Advanced Power Sources: Phase III," $1,148,000, April 22, 2003 to September 30, 2004, R. E. White (PI), R. A. Dougal, J. W. Weidner, H. J. Ploehn, P. N. Popov, and J. A. Ritter ($110,000 for JAR).
51. USC NanoCenter, "Design of Ferromagnetic Nanoprobes for Targeted Drug Delivery," $20,000, April 1, 2003 to March 31, 2004, J. A. Ritter (PI).
50. NSF, "SGER: Feasibility of High Gradient Magnetic Implants for Targeted Drug Delivery," $72,500, April 1, 2003 to March 31, 2005, J. A. Ritter (PI) and A. D. Ebner.
49. NSF, "International Travel: Third Pacific Basin Conference of Adsorption Science and Technology," $15,000, March 15, 2003 to March 31, 2005, J. A. Ritter (PI).
48. NSF I/UCRC for Fuel Cell Research, "Hydrogen Purification by Dual Reflux Pressure Swing Adsorption," $31,500, January 1, 2003 to September 30, 2003, J. A. Ritter (Project PI, co-PI of Center).
47. MeadWestvaco Charleston Research Center, "Graduate Student Fellowship to Study Cyclic Adsorption Processes," $30,000, January 1, 2003 to December 31, 2003, J. A. Ritter (PI).
46. DOE/WSRC/SCUREF, "High Capacity Complexes for Hydrogen Storage," $34,057, July 12, 2002 to September 30, 2002, J. A. Ritter (PI), A. D. Ebner and C. T. Williams.
45. USC NanoCenter, "Nanostructured Materials for Reversible Hydrogen Storage," $20,000, April 1, 2002 to June 30, 2002, J. A. Ritter (PI).

44. NSF, "Graduate Student Fellowship to Develop Magnetically Enhanced Targeted Drug Delivery Systems," August 1, 2002 to July 31, 2005, $32,000, Karen D. Daniels (Recipient) and J. A. Ritter (Advisor).
43. USC Office of Research, "Equipment to Expand the Capabilities of the High Pressure Adsorption Laboratory: Development of Hydrogen Storage Materials and Systems," $120,000, November 1, 2001 to October 31, 2002, J. A. Ritter (PI) and C. T. Williams.
42. DOE/WSRC/SCUREF, "Developing Capability to Address the Need for Enhanced Hydrogen Production and Storage for Low Weight Applications," $50,000, August 1, 2001 to July 31, 2002, T. A. Davis (PI) and J. A. Ritter ($7,000).
41. Westvaco Charleston Research Center, "Graduate Student Fellowship to Study Cyclic Adsorption Processes," $30,000, November 1, 2001 to December 31, 2002, J. A. Ritter (PI).
40. Army Research Office, "Hybrid Advanced Power Sources: Phase II," $1,150,000, July 1, 2001 to December 31, 2002, R. E. White (PI), R. A. Dougal, J. W. Weidner, H. J. Ploehn, J. A. Ritter, and P. N. Popov ($150,000 for JAR).
39. NSF, "Magnetic Separations for Environmentally Benign Processes REU Supplement," $15,000, June 25, 2001 to February 28, 2002, J. A. Ritter (PI).
38. DOE/EPSCoR, "Preparation and Characterization of Metal-Carbon Xerogels as Advanced Electrode Materials," $15,936, June 15, 2001 to August 15, 2001, R. Massoudi (PI) and J. A. Ritter.
37. Westvaco Charleston Research Center, "Graduate Student Fellowship to Study Pressure Swing Adsorption," $35,000, November 1, 2000 to October 31, 2001, J. A. Ritter (PI).
36. NSF, "Magnetic Separations for Environmentally Benign Processes Supplement," $19,941, May 1, 2001 to February 28, 2002, J. A. Ritter (PI).
35. NSF, "Magnetic Separations for Environmentally Benign Processes," $50,000, March 1, 2001 to February 28, 2002, J. A. Ritter (PI) and H. J. Ploehn.
34. Army Research Office, "Hybrid Advanced Power Sources," $1,150,000, June 15, 2000 to December 31, 2001, R. E. White (PI), R. A. Dougal, J. W. Weidner, H. J. Ploehn and J. A. Ritter, and P. N. Popov ($150,000).
33. DOE/WSRC/SCUREF, "Doped Carbon Nanotubes for Hydrogen Storage," $50,000, February 2, 2001 to October 31, 2001, J. A. Ritter (PI).
32. DOE/EPSCoR, "Preparation and Characterization of Ruthenium-Carbon Xerogels as Advanced Electrode Materials," $15,936, June 15, 2000 to August 15, 2000, R. Massoudi (PI) and J. A. Ritter.
31. NSF, "Magnetic Separations for Environmentally Benign Processes," $50,000, March 1, 2000 to February 28, 2001, J. A. Ritter (PI) and H. J. Ploehn.
30. Westvaco Charleston Research Center, "Graduate Student Fellowship to Study Pressure Swing Adsorption," $35,000, November 1, 1999 to October 31, 2000, J. A. Ritter (PI).
29. DOE/EPSCoR, "New Materials, Modeling and Design Tools for Capacitors and Batteries," sub-task of Electrochemical Power Systems", ($2,295,935), October 1, 1999 to September 30, 2001, R. E. White (overall PI), J. A. Ritter (sub-task PI) ($75,000).
28. Westvaco Charleston Research Center, "Graduate Student Fellowship to Study Pressure Swing Adsorption," $20,000, November 1, 1998 to October 31, 1999, J. A. Ritter (PI).
27. DOE/EPSCoR, "Preparation and Characterization of Metal-Carbon Xerogels as Advanced Electrode Materials,"$15,332, June 15, 1999 to August 15, 1999, R. Massoudi (PI) and J. A. Ritter.
26. Separations Research Program, University of Texas at Austin, "Characterization of Novel

Adsorbent Materials for Gas Phase Separation Processes," $25,000, April 1, 1999 to March 31, 2004, J. A. Ritter (PI).

25. USC Venture Fund, "Feasibility of Bulk Vapor Separation by Pressure Swing Adsorption," $21,985, May 1, 1998 to April 30, 1999, J. A. Ritter (PI).
24. DOE/EPSCoR, "Preparation and Characterization of Metal-Carbon Xerogels as Advanced Electrode Materials," $13,130, June 16, 1998 to August 15, 1998, R. Massoudi (PI) and J. A. Ritter.
23. INEL/DOE, "Studies in Magnetic Field Enhanced Separations for Aqueous Solutions," $15,000, March 1, 1998 to September 30, 1998, J. A. Ritter (PI).
22. U. S. Civilian Research and Development Foundation "Investigation on the Mechanisms of Selective Ion Adsorption on Composite Adsorbents," $45,000, June 1, 1997 to May 31, 1999, A. M. Puziy (PI), S. A. Khainkov and J. A. Ritter ($9,000).
21. NSF, "Research Experiences for Undergraduates Supplement to Cyclic Adsorption Processes for Solvent Vapor Recovery," $6,000, July 19, 1997 to September 30, 1998, J. A. Ritter (PI).
20. DOE/EPSCoR, "New Materials, Modeling and Design Tools for Capacitors and Batteries," sub-task of "Electrochemical Power Systems," ($2,295,935), September 1, 1997 to August 31, 1999, R. E. White (overall PI), J. A. Ritter (sub-task PI) ($75,000).
19. DOE/EPSCoR, "Preparation and Characterization of Carbon Xerogels and Metal-Carbon Xerogels as Advanced Electrode Materials," $9,833, June 16, 1997 to August 15, 1997, R. Massoudi (PI) and J. A. Ritter.
18. Argonne National Laboratory/DOE, "High Gradient Magnetic Separation Studies," $110,000, March 1, 1997 to February 28, 2000, J. A. Ritter (PI).
17. NSF, "Research Experiences for Undergraduates Supplement to Cyclic Adsorption Processes for Solvent Vapor Recovery," $10,000, July 19, 1996 to September 30, 1998, J. A. Ritter (PI).
16. OER-DOE, "Synthesis, Characterization, and Testing of Novel Anode and Cathode Materials for Li-Ion Batteries," $612,000, September 1, 1996 to August 31, 1999, R. E. White (PI), B. Popov and J. A. Ritter ($204,000)
15. DoD/EPSCoR, "Supercapacitors and Batteries from Sol-Gel Derived Carbon-Metal Oxide Electrodes," $600,000, September 1, 1996 to August 31, 1999, J. A. Ritter (PI), J. W. Weidner and R. E. White ($200,000 for JAR)
14. DOE/EPSCoR, "Synthesis and Characterization of Supercapacitors," $10,000, May 16, 1996 to July 15, 1996, R. Massoudi (PI) and J. A. Ritter.
13. Laidlaw Environmental Services Inc. Graduate Fellowship, "Field-Enhanced Adsorption Processes for the Removal and Recovery of Metals from Aqueous Solutions," $45,000, June 1, 1996 to May 31, 1999, J. A. Ritter (PI).
12. NSF, "A Laboratory Course to Teach Chemical Manufacturing," $31,865, September 1, 1996 to August 31, 1998, M. A. Matthews (PI), J. A. Ritter and F. Gadala-Maria.
11. Westvaco Charleston Research Center, "Graduate Student Fellowship to Study Pressure Swing Adsorption," $38,000, July 1, 1995 to October 31, 1998, J. A. Ritter (PI).
10. NSF SGER, "Magnetic Swing Adsorption," $25,000, September 1, 1995 to January 31, 1997, J. A. Ritter (PI).
9. DOE/EPSCoR, "Sol-Gel Derived Carbon-Metal Oxide Electrodes as Supercapacitors," sub-task of "Electrochemical Power Systems," ($2,349,111), September 1, 1995 to August 31, 1997, R. E. White (overall PI), J. A. Ritter (sub-task PI) ($75,000).
8. NSF, "Graduate Research Traineeships in Environmentally Conscious Manufacturing,"

$562,500, September 15, 1995 to September 15, 2000, W. H. Peters (PI), J. A. Khan, M. A. Matthews, J. A. Ritter and C. L. Bolton.

7. NSF, "Research Experiences for Undergraduates Supplements," $10,000, March 31, 1995 to September 30, 1997, J. A. Ritter (PI).
6. NSF, "Engineering Research Equipment: Integrated Micro Balance System," $35,000, August 1, 1995 to July 31, 1996, J. A. Ritter (PI).
5. USC Office of Research, "Building Experimental Apparatuses for Fundamental Research," $1,500, June 15, 1994 to June 30, 1995, J. A. Ritter (PI).
4. NSF Research Initiation Award, "Cyclic Adsorption Processes for Solvent Vapor Recovery," $110,000, July 15, 1994 to September 30, 1998, J. A. Ritter (PI).
3. DOE/WSRC/SCUREF, "Dissolution of Contaminated Fiberglass Filters," $135,292, May 11, 1994 to May 11, 1995, J. A. Ritter (PI).
2. DOE/WSRC/SCUREF, "Waste Minimization Methods and Equipment Development for Analytical Instrumentation Effluents," $164,000, February 11, 1994 to August 15, 1995, J. A. Ritter (PI).
1. USC Research and Productivity Scholarship, “Characterization of Novel Adsorbent Materials,” $3,000, January 1, 1994 to June 30, 1995, J. A. Ritter (PI).

STUDENTS GRADUATED

PhD

1. Yujun Liu, Solvent Vapor Recovery by Pressure Swing Adsorption, May 1998.
2. Chuan Lin, Sol-Gel Derived Electrode Materials for Supercapacitor Applications, August 1998.
3. Huanhua Pan, Application of Density Functional Theory to Interfacial Phenomena, August, 1999.
4. Armin D. Ebner, Theoretical and Experimental Developments in Nano and Traditional High Gradient Magnetic Separation, December 2000.
5. Shaheen A. Al-Muhtaseb, Thermodynamic and Kinetic Prospects in the Modeling of Gas Phase Adsorption Processes, May, 2001.
6. Sarang A. Gadre, Experimental Design and Simulation of a Metal Hydride Hydrogen Storage System, June 2003.
7. James A. McIntyre, Theoretical and Experimental Analyses of Novel Pressure Swing Adsorption Cycles for Heavy Component Enrichment, July 2003.
8. Steven P. Reynolds, Heavy and Dual Reflux Pressure Swing Adsorption Cycles: Carbon Dioxide Capture and Concentration at High Temperature using K-promoted Hydrotalcite, May 2007.
9. Jun Wang, Synthesis, Development of Metal Complex Hydrides as Reversible Hydrogen Storage Materials, June 2007.
10. Misael O. Aviles, Theoretical and Experimental Studies of Implant Assisted Magnetic Drug Targeting, February 2008.
11. Hai Du, Carbon Dioxide Capture with K-Promoted HTlc at High Temperature, March 2010.
12. Jan O. Mangual, Novel Implant Designs in Magnetic Drug Targeting, September 2010.
13. Amal Mehrotra, Cycling Scheduling and Design of Pressure Swing Adsorption Cycles for Carbon Dioxide Capture from Flue Gas, March 2011.
14. Shubhra Bhadra, Purification of Ammonia by Pressure Swing Adsorption, February 2012.

15. Fan Wu, New Approach for Modeling Hybrid Pressure Swing Adsorption-Distillation Processes, August 2013.
16. Anahita Abdollahi Govar, Development of a Pressure Swing Adsorption Process for CO_2 Capture from Flue Gas Using Solid Amine Sorbents, February 2014.
17. Mohammad Iftekhar Hossain, Volume Swing Frequency Response Method for Determining Mass Transfer Mechanisms in Microporous Adsorbents, February 2014.
18. Atikur Rahman, Development of Pressure Swing Adsorption Process for CO_2 Capture from Flue Gas, February 2016.
19. Lutfi Erden, Methane Separation and Purification via Pressure Swing Adsorption, June 2016.
20. Hanife Erden, Two-Stage PSA System for CO_2 Removal and Concentration During Closed-Loop Human Space Exploration Missions, November 2016.
21. Nima Mohammadi, CO_2 Capture from Flue Gas by PSA Using a Novel Structured Adsorbent, December 2016.

MS

1. Dharmashankar Subramanian, Equilibrium Theory for Solvent Vapor Recovery using Pressure Swing Adsorption, MS, 1997.
2. Ruyu (Ruby) Zhang, New Approximate Models for Nonlinear Adsorption and Diffusion in a Single Particle, MS, 1997.
3. Emily J. Zanto, Sol-Gel Derived Materials for Use as Adsorbents, Double Layer Capacitors and Lithium Ion Intercalation Compounds, MS, 1999.
4. Karen D. Daniel, Equilibrium Theory Analysis of a Pressure Swing Adsorption Cycle Utilizing an Unfavorable Langmuir Isotherm, MS, 2003.
5. Yongfeng Wang, Two Dimensional Simulations of the Charge and Discharge of a Metal Hydride Hydrogen Storage Bed, MS, 2007.
6. Dongxiang Yang, Development of a Cascade Adsorption Process for Rapid Xenon Concentration from Air for Nuclear Proliferation Monitoring, MS, 2010.
7. Joshua P. White, Development of a Pressure Swing Adsorption (PSA) Process for CO_2 Capture from Flue Gas, MS, 2016.
8. Peter A. Fairchild, Adsorption Reversibility of SO_2, NO_2 and NO on 13X and 5A Zeolites, MS, 2016.
9. Hind Shabbani, Determination and Validation of High Pressure Equilibrium Adsorption Isotherms Via a Volumetric System, MS, May 2017.
10. Pravin B. Charles, Role of Bed Design Characteristics on the Effective Thermal Conductivity of a Structured Adsorbent, MS, May 2018.
11. Olivia Smithson, Volume Swing Frequency Response Method for Determining Mass Transfer Mechanisms of Ar, CO_2, N_2 and O_2 in Carbon Molecular Sieve 3K172, MS, August 2020.
12. Sofia Tosso, Heterogeneous Extended Langmuir Model with a Truncated Multi-Normal Energy Distribution for Fitting Unary Data and Predicting Mixed-Gas Adsorption Equilibria, MS, February 2021.

South Carolina Honors College Senior Theses

1. Stephen Ortaldo, Characterization of Novel Adsorbent Materials, Honors College Thesis, ECHE 499, Fall 1994–Spring 1995.
2. Jonathan Skvoretz, Study on Novel Adsorbents and Adsorption Systems, Honors College

Thesis, ECHE 499, Fall 1994–Spring 1995.
3. Scott Shealy, Determination of Adsorbed Phase Heat Capacity using Differential Scanning Calorimetry, Honors College Thesis, ECHE 499, Fall 1996–Spring 1997.
4. Elizabeth Endler, Synthesis and Characterization of Silica Gels Containing Metal Chlorides for Gas Separation, Honors College Thesis, ECHE 499, Fall 1997–Spring 1998.
5. Stephen Veldman, A Study of the Vapor Pressure Versus Temperature Relationship of n-Docosane through Knudsen Effusion, Honors College Thesis, ECHE 499, Fall 1997–Spring 1998.
6. Robert Riggleman, On the Development of Metal and Mixed Metal Sodium Aluminum Hydride for Hydrogen Storage, Honors College Thesis, ECHE 499, Fall 2001–Spring 2002.
7. Jonathan Braxton, Effect of Diverse Design parameters on the Performance of a Metal Hydride Hydrogen Storage Vessel, Honors College Thesis, ECHE 499, Fall 2003-Spring 2004.

OTHER RESEARCH STUDENTS

Postdoctoral Fellows

1. Yujun Liu, Development of Efficient Simulation Codes for Cyclic Adsorption Processes using Adaptive Grids, August 1998 to March 2000.
2. Armin D. Ebner, Design and Analysis of Novel Materials and Systems for Hydrogen Storage, January 2001 to September 2001.
3. Shaheen A. Al-Muhtaseb, April 15 2001 to October 31, 2002, Development of Adsorption Isotherm Models for Complex Metal Hydride Systems.
4. Sarang A. Gadre, Simulator Development for Cyclic Adsorption Process and Metal Hydride Hydrogen Storage Systems, July 2003 to January 2005.
5. Tania Prozorov, Development of Novel Sonochemical Doping Technique for Complex Hydride Hydrogen Storage Materials, April 2004 to July 2005.
6. Tao (Tony) Wang, Development of Boron Based Complex Hydride Hydrogen Storage Materials, August 2005 to September 2007.
7. Fan Wu, Modeling Hybrid Pressure Swing Adsorption-Distillation Processes, September 2013 to September 2014.
8. Mohammad Iftekhar Hossain, CFD Modeling of Heat and Mass Transfer during the Drying of Spent Fuel Rod Casks, February 2014 to March 2017.

Visiting Scholars

1. Jiacheng Shen (China), Measurement of Adsorption Isotherms of Heavy Metal Ions on Various Adsorbents, October 1996 to January 1999.
2. Alexander M. Puziy (Ukraine), Mechanism of Ion Binding by Carbon-Composite Adsorbents, March 1999 to April 1999.
3. Masayuki Yoshida (Japan), Development of Novel Pressure Swing Adsorption Cycles for High Heavy Component Enrichment, April 1999 to March 2000 (visiting PhD student from Kumamoto University, Japan).
4. Noriaki Wakao, Professor Emeritus, Yokohama National University of Japan, Heat and Mass Transfer Analyses in Complex Cyclic Adsorption Systems, September 2002 to December

2002.

5. Haitao Chen, Development of Magnetic Stents for Targeted Drug Delivery in the Vascular System, January 2004 to December 2004 (visiting PhD student from IIT and University of Chicago).
6. Claudia F. Martin (Spain), Measurement and Analysis of Carbon Dioxide Adsorption Isotherms on Synthetic Carbon Adsorbents, September 2010 to December 2010.
7. Yan Sun (China), Adsorbent Modification for Terrestrial and Extraterrestrial Applications, September 2014 to August 2015.
8. Natthaphon Choomphon-anomakhun (Thailand), Simulation of Dynamic Magnetic Particle Capture and Accumulation Around a Ferromagnetic Wire, February 2015 to February 2016 (visiting PhD student from Chulalongkorn University, Thailand).
9. Parisa Eghbal Jahromi (Iran), Pressure Swing Adsorption Process Modeling with AspenTech Adsim (visiting PhD student from Tehran University, Iran), February 2016 to September 2016.

CURRENT RESEARCH GROUP

Research Professor

1. Armin D. Ebner, Design and Analysis of Novel Materials and Systems for Adsorptive Gas Separation, Purification and Storage, October 2001 to present.

Research Associates

1. Marjorie A. Nicholson, Development of Testing and Analysis Techniques for Adsorbent Characterization, June 2006 to present.
2. Charles D. Holland, Design, Construction, Operation and Maintenance of Engineering Systems Adsorptive Gas Separation, Purification and Storage for June 2018 to present.

PhD Students

1. Behnam Fakhari Kisomi, Role of Equalization Tanks in Gas Separation by Pressure Swing Adsorption, August 2017 to present.
2. Huan Jiang, Inclusion of Real Pump Curves in a Pressure Swing Adsorption Process Simulator, August 2017 to present.
3. Pravin B. Charles, Breakthrough Curve Analysis in Parallel Channel Structured Adsorbent Beds, June 2018 to present.
4. Daio Adegunju, Analysis of Pressure Swing Adsorption Cycle Schedules for Steel Mill Flue Gas Streams, August 2018 to present.
5. Ryan Sanders, Development of a PVSA Process for Metabolic CO_2 Removal from Spacecraft Cabins, May 2019 to present.

MS Students

1. Todd Harris, Analysis of Multiplicity in Complex, Multi-Bed, Adiabatic, PSA Processes, August 2014 to present (part-time).

Visiting Scholars

Currently none.

Undergraduate Students

Joseph Ritter

TEACHING EXPERIENCE

Undergraduate Courses

Unit Operations-I, CE318, SUNY Buffalo
Unit Operations-II, CE418, SUNY Buffalo
Chemistry for Non-Science Majors-I, CHEM 106, Consortium of the Niagara Frontier
Chemistry for Non-Science Majors-II, CHEM 107, Consortium of the Niagara Frontier
Chemical Process Principles, ECHE 300, University of South Carolina
Mass Transfer, ECHE 322, University of South Carolina
Separation Process Design, ECHE 440, University of South Carolina
Chemical Engineering Laboratory I, ECHE 460, University of South Carolina
Chemical Engineering Laboratory II, ECHE 461, University of South Carolina
Separations Topic: Fundamentals of Adsorption and Adsorption Processes, ECHE 589R, University of South Carolina

Graduate Courses

Separations Topic: Fundamentals of Adsorption and Adsorption Processes, ECHE 789R, University of South Carolina

Invited Short Courses

1. "Industrial Processes of Adsorption," Universidade Federal Do Ceara, Fortaleza, Brazil, May, 2002.
2. "Adsorption Theory and Practice," Instructor for Continuing Education, American Institute of Chemical Engineers, New York, NY, 2003 to 2005.
3. "Introduction to Adsorption: Theory and Practice," SeQual Technologies, San Diego, CA, April, 2006.
4. "Adsorption: Theory and Practice," Atlas Copco, Belgium, September, 2006.
5. "Pressure Swing Adsorption and Other Cyclic Adsorption Processes and Applications," Professional Analytical and Consulting Services, Pittsburgh PA, October 2007.
6. "Adsorption Fundamentals and Pressure Swing Adsorption," Eastman Chemical Company, Kingsport, TN, August, 2008.
7. "Adsorption Theory and Practice," Eastman Chemical Company, Kingsport, TN, August, 2009.
8. "Pressure Swing Adsorption and Other Cyclic Adsorption Processes and Applications," Professional Analytical and Consulting Services, Pittsburgh PA, October 2009.
9. "Adsorption Theory and Practice," INGENCO, Richmond VA, April 2011.

10. “Adsorption Theory and Practice,” Corning Inc., Corning, NY, June 2011.
11. “Pressure Swing Adsorption and Other Cyclic Adsorption Processes and Applications,” Professional Analytical and Consulting Services, Pittsburgh PA, October 2011.
12. “Adsorption Theory and Practice,” MeadWestvaco, Charleston, SC, April 2012.
13. “Adsorption Theory and Practice,” NASA MSFC, Huntsville, AL, February 2013.
14. “Pressure Swing Adsorption and Other Cyclic Adsorption Processes and Applications,” Professional Analytical and Consulting Services, Pittsburgh PA, October 2013.
15. “Pressure Swing Adsorption and Other Cyclic Adsorption Processes and Applications,” Professional Analytical and Consulting Services, Pittsburgh PA, September 2014.
16. “Adsorption Theory and Practice,” BP-Amoco Chemical Company, Naperville, IL, August 2015.
17. “Pressure Swing Adsorption and Other Cyclic Adsorption Processes and Applications,” Professional Analytical and Consulting Services, Pittsburgh PA, September 2018.