

ARUP K. CHAKRABORTY

CURRENT POSITION

Robert T. Haslam Professor of Chemical Engineering, Professor of Chemistry, and Professor of Biological Engineering, MIT.

RESEARCH INTERESTS

Molecular and Cellular Immunology, Immune response to HIV, Cell Membranes, Statistical Mechanics.

EDUCATION

Postdoctoral Fellow, University of Minnesota, 1987-1988; Ph.D., Chem. Eng., University of Delaware, 1988; Bachelor of Technology, Chem. Eng., IIT, Kanpur, 1983.

AWARDS AND HONORS

- Katz Lectures, CCNY (2010)
- Raman Memorial Lectures (2009)
- Elected Fellow, American Association for the Advancement of Science (2008)
- Distinguished Alumnus Award, Indian Institute of Technology-Kanpur (2008)
- Elected, Fellow of the American Academy of Arts and Sciences (2007)
- E.O. Lawrence Award for Life Sciences (2007)
- NIH Director's Pioneer Award (2006)
- Presidential Citation for Outstanding Achievement, University of Delaware (2005)
- Wilber Lecture, Rice University (2005)
- Doraiswamy Lecturer, Iowa State Univ. and National Chemical Laboratory, India (2005)
- Dept. of Chem. Eng. Teaching Award, UC Berkeley (2005)
- Engineering Foundation Endowed Lectureship, U.T. Austin (2005)
- Elected, Member of the National Academy of Engineering (2004)
- Professional Progress Award, American Institute of Chemical Engineers (2004)
- Merck Collaboratus Lectures, Rutgers University (2004)
- Trotter Lecturer, University of Tennessee, Knoxville (2004)
- Chemcon Distinguished Lecturer Award, Bhubaneswar, India (2003)
- Robert W. Vaughan Memorial Lecturer, Caltech (2000)
- Research Professor, Miller Institute for Basic Science, Berkeley (1999-00)
- Featured Speaker, NAE Frontiers of Engineering Meeting (1999)
- Allan P. Colburn Award, American Institute of Chemical Engineers (1996)
- Camille Dreyfus Teacher-Scholar Award (1994)
- AIChE, Berkeley Student Chapter, Appreciation for Distinguished Teaching (1996-97)
- National Young Investigator Award (1992-1997)
- Allan P. Colburn Memorial Lecture, University of Delaware (1993)
- Royal Academy of Engineering (U.K.), ICI Fellowship (1993- 1998)
- Shell Young Faculty Fellow (1989-1992)
- Best Review Paper, Intl. Conference on Polymer/Solid Interfaces, Belgium (1991)

PROFESSIONAL SERVICE

Editorial boards:

Editorial Board: *Biophysical Journal*, 2007 – present; Editorial Board: *Chemical Physics*, 2001 – present; Editorial Board: *Annual Reviews of Physical Chemistry*, 2007-present; Editor-in-Chief: *Advances in Chemical Engineering*, 2001-2003.

National Academy panels:

Chair, NRC panel tasked with writing a report on research opportunities in *Biomolecular Materials and Processes*.

Visiting committees:

Visiting committees for chemical engineering departments at: 1] University of Southern California 2] University of California, Santa Barbara 3] Lehigh University 4] University of Delaware.

Scientific advisory board:

Scientific Advisory Board member for the Molecular Foundry at Lawrence Berkeley National Laboratory, a National Facility.

Scientific advisory board member of SYBILA (a European consortium on systems immunology).

National Institute of Health:

Member, NIH study section on Mathematical Analysis of Biological Systems.

PROFESSIONAL EXPERIENCE

University of California at Berkeley

Assistant Professor of Chemical Engineering (Dec 1988 - July 1993)

Associate Professor of Chemical Engineering (July 1993 - June 1997)

Professor of Chemical Engineering and Professor of Chemistry (July 1997-June 2001)

Warren and Katherine Schlinger Distinguished Professor, Chair of Chemical Engineering, Professor of Chemistry, Head, Theoretical and Computational Biology, LBNL, University of California, Berkeley (July 2001 – April 2005).

Professor of Chemical Engineering, Professor of Chemistry, and Member of Biophysics Graduate Group, Head, Computational and Theoretical Biology department, LBNL (April 2005 – July 2005).

Massachusetts Institute of Technology

Visiting Professor of chemical engineering (January 1996 - December 1996)

Robert T. Haslam Professor of Chemical Engineering, Chemistry, Biological Engineering (July 2005 – present)

PUBLICATIONS AND INVITED LECTURES

Over 140 publications and 245 invited lectures on research; 1 edited book.

PUBLICATIONS

1. "Sink Flows of Viscoelastic Fluids", with A.B. Metzner, *J. Rheol.*, **30**, 29 (1986).
2. "CO₂ Absorption in Aqueous Solutions of Sterically Hindered Amines ", with G. Astarita and K.B. Bischoff, *Chem. Eng Sci.*, **41**, 997 (1986).
3. "Boundary Layer Analysis for the Modeling of Non-Catalytic Gas-Solid Reactions", with G. Astarita, *I.E.C. Research*, **26**, 972 (1987).
4. "A Molecular Orbital Approach to Substituent Effects in Amine - CO₂ Interactions", with G. Astarita et al., *J. Am. Chem. Soc.*, **110**, 6947 (1988).
5. "A Molecular Orbital Study of the Interactions of Acrylic Polymers with Aluminum: Implications for Adhesion", with H.T. Davis, M. Tirrell, *J. Polym. Sci.: Polym. Chem. Ed*, **28**, 3185 (1990).
6. "Energetics and Near - Surface Structure at Polymer - Metal Interfaces", with J.S. Shaffer, *Polymer Preprints*, **31**, 546 (1990).
7. "Effect of Silicate Ratio on the Distribution of Silicate and Aluminosilicate Anions in TPA Aluminosilicate Solutions", with R.F. Mortlock et al., *J. Phys. Chem.*, **95**, 4501 (1991).
8. "The Nature of the Interactions of poly (methyl methacrylate) Oligomers with an Aluminum Surface", with J. S. Shaffer et al., *J. Chem. Phys.* **95**, 8616 (1991).
9. "On the Existence of Non-Equilibrium, Glass-Like Structures at Strongly Interacting Polymer-Solid Interfaces", with J.S. Shaffer, P.M. Adriani, *Macromolecules*, **24**, 5226 (1991).
10. "Effects of Solvent Polarity and Temperature on the Conformational Statistics of a Simple Macrocyclic Polyether", with Y.L. Ha, *J. Phys. Chem.*, **95**, 10781 (1991).
11. "The Effects of Local Structural Relaxation on Aluminum Siting in H-ZSM-5", with S.R. Lonsinger et al., *Catalysis Letters*, **11**, 209 (1991).
12. "Progress and Future Directions in the Theory of Strongly Interacting Polymer/Solid Interfaces", Proceedings of the First International Conference on Polymer/Solid Interfaces, page 3, I.O.P. Publishing Ltd., Bristol, U.K. (1992).

13. "Segment Level Chemistry and Chain Conformation in the Reactive Adsorption of PMMA on Aluminum Oxide Surfaces", with K. Konstantinidis et al., *Langmuir*, **8**, 1307 (1992).
14. "Structure and Dynamics at Polymer/Metal Interfaces", with P.M. Adriani, J.S. Shaffer, *Polymer Preprints*, **33**, 613 (1992).
15. "Glassy Relaxation at Polymer - Solid Interfaces", with P.M. Adriani, *Macromolecules*, **25**, 2470 (1992).
16. "The Nature of the Interactions of Ammonium Cations with 18-Crown-6", with Y.L. Ha, *J. Phys. Chem.*, **96**, 6410 (1992).
17. "Dynamics of Relaxation at Strongly Interacting Polymer- Solid Interfaces: Effects of Chain Architecture", with P.M. Adriani, *J. Chem. Phys.*, **98**, 4263 (1993).
18. "Dynamics of PMMA Chains Adsorbed on Aluminum Surfaces" with J.S. Shaffer, *Macromolecules*, **26**, 1120 (1993).
19. "Electronic and Structural Features of the Acid Site in H-ZSM-5", with S.J. Cook et al., *J. Phys. Chem.*, **97**, 6679 (1993).
20. "Complexation of Ammonium Cations with 18-Crown-6: Simulations Using Proper Potentials", with Y.L. Ha, *J. Phys. Chem.*, **97**, 11291 (1993).
21. "Diffusion of Ionic Penetrants In Charged Disordered Media", with D. Bratko, David Chandler, *J. Chem. Phys.*, **100**, 1528 (1994).
22. "Characterization of Crown Ethers as Macrocyclic Elements for Rotaxane Preparation: A Monte - Carlo Simulation", with Y.L. Ha, *Chem. Eng Sci.*, **49**, 2859 (1994).
23. "Solvation of Simple Crown Ethers using the XRISM method", with Y.L. Ha, *J. Phys. Chem.*, **98**, 11193 (1994).
24. "Surface-Induced Ordering for Adsorbed Random Block Copolymers", with L. Gutman, *J. Chem. Phys.*, **101**, 10074 (1994).
25. "Elastic Constants for Random Block Copolymers in the Strong Segregation Limit: Effects of Sequence Distribution", with G.H. Fredrickson, *Macromolecules*, **27**, 7079 (1994).
26. "Electronic Structure Calculations for Ammonia Adsorption in H-ZSM-5", with A. Kyrlidis, A.T. Bell, S.J. Cook, *J. Phys. Chem.*, **99**, 1505 (1995).
27. "Polyelectrolyte Configuration in Disordered Media", with D. Bratko, *Phys. Rev. E.*, **51**, 5805 (1995).

28. "Phase Behavior of Random Copolymers in Quenched Random Media", with E.I. Shakhnovich, *J. Chem. Phys.*, **103**, 10751 (1995).
29. "A Field Theory for Random Copolymers Near Solid Surfaces: Analysis of Interfacial Chain Organization and Adsorption-Desorption Phase Diagram", with L. Gutman, *J. Chem. Phys.*, **103**, 10733 (1995).
30. "Schrodinger Equations and Diffusion Theory by M. Nagasawa", *AIChE Journal*, **41**, 2665 (1995).
31. "Polymer Adsorption", with M. Tirrell, feature article in *Special issue of the MRS Bulletin on Polymer Surfaces and Interfaces*, **21**, 28 (1996).
32. "Frozen Phases of Random Heteropolymers in Disordered Media", with D. Bratko, E.I. Shakhnovich, *Phys. Rev. Letts.*, **76**, 1844 (1996).
33. "A Numerical Study of Polyampholyte Configuration", with D. Bratko, *J. Phys. Chem.*, **100**, 1164 (1996).
34. "Local Spin-Density Functional Theory Study of Copper Ion-Exchanged ZSM-5", with B.L. Trout, A.T. Bell, *J. Phys. Chem.*, **100**, 4173 (1996).
35. "Sequence Fluctuation Dependent Adsorption-Depletion Transition for Random Heteropolymers", with L. Gutman, *J. Chem. Phys.*, **104**, 7306 (1996).
36. "Morton M. Denn - Teacher and Scholar", with A.B. Metzner, T.W.F. Russell, *Chem. Eng. Educ.*, **30**, 88 (1996).
37. "Ion-Ion Correlations in Quenched Disordered Media", with D. Bratko, *J. Chem. Phys.*, **104**, 7700 (1996).
38. "Adsorption / Freezing Transition for Random Heteropolymers Near Disordered 2-D Manifolds Due to Pattern Matching", with S. Srebnik, E.I. Shakhnovich, *Phys. Rev. Letts.*, **77**, 3157 (1996).
39. "Exotic Surface Transitions of Random Heteropolymers Near Smooth Surfaces", with L. Gutman, *J. Chem. Phys.*, **105**, 7842 (1996).
40. "Analysis of the Thermochemistry of NO_x Decomposition Over Cu-ZSM-5 Based on Quantum Chemical and Statistical Mechanical Calculations", with B.L. Trout, A.T. Bell, *J. Phys. Chem.*, **100**, 17582 (1996).
41. "The Structure of a Random Heteropolymer in a Disordered Medium: Ensemble Growth Simulation", with D. Bratko, E.I. Shakhnovich, *J. Chem. Phys.*, **106**, 1264 (1997).

42. "Diffusion and Reaction in ZSM-5 Studied by Dynamic Monte Carlo", with B.L. Trout, A.T. Bell, *Chem. Eng. Sci.*, **52**, 2265 (1997).
43. "Recognition Between Random Heteropolymers and Multifunctional Disordered Surfaces", with E.I. Shakhnovich and D. Bratko, *Chem. Phys. Lett.*, **280**, 46 (1997).
44. "Density Functional Theory Calculations of the Effects of Local Composition and Defect Structure on the Proton Affinity of H-ZSM-5", with N. Gonzales, A.T. Bell, *J. Phys. Chem. B.*, **101**, 10058 (1997).
45. "Giovanni Astarita", with T.W.F. Russell, A. B. Metzner, *Physics Today* **50**, 84 (1997).
46. "Polymer Adsorption on Disordered Substrates", with E.I. Shakhnovich, *Phys. Rev. Lett.* **79**, 4931(1997).
47. "A Simple Theory and Monte-Carlo Simulations for Recognition Between Random Heteropolymers and Disordered Surfaces", with D. Bratko, *J. Chem. Phys.*, **108**, 1676 (1998).
48. "Freezing of Compact Random Heteropolymers with Correlated Sequence Fluctuations", with E. I. Shakhnovich, V. S. Pande, *J. Chem. Phys.*, **108**, 1683 (1998).
49. "A Density Functional Theory Study of the Effects of Metal Cations on the Bronsted Acidity of H-ZSM-5", with N. O. Gonzales, A. T. Bell, *Catalysis Letters*, **50**, 135 (1998).
50. "Adsorption of Random Heteropolymers on Disordered Surfaces", with D. Bratko, E. I. Shakhnovich, *Theor. and Comp. Polym. Sci.*, **8**, 113 (1998).
51. "Effect of Topology and Molecular Occupancy on Self-Diffusion in Lattice Models of Zeolites", with M.O. Coppens, A.T. Bell, *Chem. Eng. Sci.*, **53**, 2053 (1998).
52. "A Density Functional Theory Study of the Interactions of H₂O with H-ZSM-5, Cu-ZSM-5, and Co-ZSM-5", with M.J. Rice, A.T. Bell, *J. Phys. Chem.*, **102**, 7498 (1998).
53. "Random Heteropolymer Adsorption on Disordered Multifunctional Surfaces: Effect of Specific Intersegment Interactions", with S. Srebnik, D. Bratko, *J. Chem. Phys.*, **109**, 6415 (1998).
54. "Adhesion Promotion at a Homopolymer-Solid Interface Using Random Heteropolymers", with R.E. Simmons, *J. Chem. Phys.*, **109**, 8667 (1998).
55. "Applications of Density Functional Theory to Study the Physical and Chemical Properties of Transition Metal Cation-Exchanged Zeolites", with M.J. Rice, N.O. Gonzales, A.T. Bell, *Proc. of 12th International Zeolite Conference*, **1**, 393-400 (1999).

56. "Microphase Ordering in Melts of Randomly Grafted Copolymers", with S. Qi, et al., *Phys. Rev. Lett.*, **82**, 2896 (1999).
57. "Dynamic Monte-Carlo and Mean-field Study of the Effect of Strong Adsorption Sites on Self-Diffusion in Zeolites", with M.-O. Coppens, A.T. Bell, *Chem. Eng. Sci.*, **54**, 3455 (1999).
58. "Behavior of a Random Heteropolymer in Mixed Solvents", *J. Chem. Phys.* **111**, 5232 (1999).
59. "Al Next Nearest Neighbor, Ring Occupation, and Proximity Statistics in ZSM-5", with M. J. Rice, A. T. Bell, *J.Catal.*, **186**, 222 (1999).
60. "A Density Functional Theory Study of Hydrogen Recombination and Hydrogen-Deuterium Exchange on Ga/H-ZSM-5", with N. O. Gonzales, A. T. Bell, *Topics in Catalysis*, **9**, 207 (1999).
61. "Simulation of Biomimetic Recognition Between Polymers and Surfaces", with A. Golumbskie and V. Pande, Featured Article, *Proc. Natl. Acad. Sci.*, **96**, 11707 (1999).
62. "Design and Synthesis of Materials with Precise Macroscopic Properties - Theoretical and Computational Approaches to Assist Rational Design: Biomimetic Recognition and Controlling Self-Assembly Processes by Tuning Polymer Architecture", *Frontiers of Engineering*, (1999).
63. "Density Functional Theory Calculations of the Oxidative Dehydrogenation of Propane on the (010) Surface of V₂O₅", with F. Gilardoni, A.T. Bell, and P. Boulet, *J. Phys. Chem. B.*, **104**, 12250 (2000).
64. "Theoretical Studies of the Coordination and Stability of Divalent Cations in ZSM-5", with M.J. Rice and A.T. Bell, *J. Phys. Chem B*, **104**, 9987 (2000).
65. "Site Availability and Competitive Siting of Divalent Metal Cations in ZSM-5", with M.J. Rice and A.T. Bell, *J. Catal*, **194**, 278 (2000).
66. "Applications of Density Functional Theory to Identify Reaction Pathways for Processes Occurring in Zeolites and on Dispersed Metal Oxides", with Jason A. Ryder et al., *Stud. Surf. Sci. Catal.* **130**, 407-412 (2000).
67. "Density Functional Theory Study of Proton Mobility in Zeolites: Proton Migration and Hydrogen Exchange in ZSM-5", with J.A. Ryder and A.T. Bell, *J. Phys. Chem. B.*, **104**, 6998 (2000).
68. "Theoretical Study of Polymeric Mixtures with Different Sequence Statistics: I. Ising class, Linear Random Copolymers with Different Statistical Sequences and Ternary

- Blends of Linear Random Copolymers with Homopolymers”, with S.Y. Qi, *J. Chem. Phys.*, **112**, 1598 (2000).
69. “Theoretical Study of Polymeric Mixtures with Different Sequence Statistics: II. Brazovskii Class, Linear Random Copolymers with Diblock Copolymers”, with S.Y. Qi, *J. Chem. Phys.*, **112**, 1598 (2000).
 70. “Disordered Heteropolymers: Models for Biomimetic Polymers and Polymers with Frustrating Quenched Disorder”, *Physics Reports*, **342**, 1 (2000).
 71. "Origin of Nanomechanical Cantilever Motion Generated from Biomolecular Interactions", G. Wu, et al., *Proc. Natl. Acad. Sci.*, **98**, 1560 (2001).
 72. "Polymer Adsorption Driven Self-Assembly of Nanostructures", with A.J. Golubfskie, *Ann. Rev. Phys. Chem.*, **52**, 537-573 (2001).
 73. "Synaptic Pattern Formation During Cellular Recognition", with S.Y. Qi et al., *Proc. Natl. Acad. Sci.*, **98**, 6548 (2001).
 74. "Microphase segregation in Molten Randomly Grafted Copolymers", S.Y. Qi and N. Balsara, *J. Chem. Phys.*, **115**, 3387 (2001).
 75. "The Phase Diagram of Molten Randomly Grafted Copolymers", with S.Y. Qi, *J. Chem. Phys.*, **115**, 3401 (2001).
 76. "Molecular Architecture can Control Surfactant Properties of Macromolecules", with A. Kreig, et al., *J. Chem. Phys.*, **115**, 6243 (2001).
 77. “Immunological Synapse Formation: Physical Chemistry Meets Cell Biology”, *Science STKE PE10* (2002).
 78. “Lighting up TCR Takes Advantage of Serial Triggering”, *Nature Immunology*, **3**, 895 (2002).
 79. “Correlation of a Dynamic Model for Synapse Formation with Effector Functions: Two Roads to Synapse Formation”, with S.J. Lee *et al.*, *Trends in Immunology*, **23**, 492 (2002).
 80. “The Synapse Assembly Model”, with S.J. Lee et al., *Trends in Immunology*, **23**, 500 (2002).
 81. “Density Functional Study of Nitrous Oxide Decomposition over Fe and Co-ZSM-5”, with J. Ryder and A.T. Bell, *J. Phys. Chem.*, **100**, 4173 (2002).
 82. “Nanomechanical Forces Generated by Surface Grafted DNA”, with M.F. Hagan and A. Majumdar, *J. Phys. Chem. B*, **106**, 10163 (2002).

83. "Thermodynamics and Phase Behavior of Block Copolymer/Homopolymer Blends", with Attractive and Repulsive Interactions", with J.H. Lee et al., *Macromolecules*, **35**, 7748 (2002).
84. "Analysis of Pattern Formation and Phase Separation in the Immunological Synapse", with Y. Hori and S. Raychaudhuri, *J. Chem. Phys.*, **117**, 9491 (2002).
85. "Sequence Dependence of Polymer Dynamics in Disordered Media", with S.J. Lee, *J. Chem. Phys.*, **117**, 10869 (2002).
86. "Low TCR Expression Contributes to Dynamic Multifocal Synapses in Thymocytes", with S.J. Lee, Yuko Hori, *Proc. Natl. Acad. Sci.*, **100**, 4383 (2003).
87. "Biasing a Transition State Search for Complex Reactions", with B. Peters et al., *J. Chem. Phys.*, **118**, 9533 (2003).
88. "Decoding Communications Between Cells in the Immune System Using Principles of Chemical Engineering", *AIChE J.*, **49**, 1614 (2003).
89. "In Silico Models in Molecular and Cellular Immunology: Successes, Promises, and Challenges", with A.S. Shaw and M.L. Dustin, *Nature Immunology*, **4**, 933 (2003).
90. "Macromolecules at Surfaces: Research Challenges and Opportunities from Tribology to Biology", with S. Granick et al., *J. Polym. Sci. Part B: Polym. Phys.*, **41**, 2755 (2003).
91. "The Immunological Synapse Balances T Cell Receptor Signaling and Degradation", with K.H. Lee, et al., *Science*, **302**, 1218 (2003).
92. "An Effective Membrane Model for the Immunological Synapse", with S. Raychaudhuri, M. Kardar, *Phys. Rev. Lett.*, **92**, 208101 (2003).
93. "Density Functional Theory Study of Benzene Oxidation over Fe-ZSM-5", with J. Ryder et al., *J. Catalysis*, **220**, 84 (2003).
94. "Atomistic Simulation of Kinetic Pathways for DNA Unbinding and Hybridization", with M. Hagan et al., *Proc. Natl. Acad. Sci.*, **100**, 13922 (2003).
95. "Hybridization Dynamics of Surface Immobilized DNA", with M. Hagan, *J. Chem. Phys.*, **120**, 4958 (2004).
96. "A Growing String Method for Determining Transition States: Comparison to the Nudged Elastic Band and String Methods", with B. Peters et al., *J. Chem. Phys.*, **120**, 7877 (2004).

97. “CD4 Coordinates Lck Accumulation in the Immunological Synapse: Implications for the Sensitivity of T Cells to Antigen”, with Q. Li et al., *Nature Immunol.*, **5**, 791 (2004).
98. “Rate Constants from the Reaction Path Hamiltonian I: Reactive Flux Simulations for Dynamically Corrected Rates”, with B. Peters and A.T. Bell, *J. Chem. Phys.*, **121**, 4453 (2004).
99. “Rate Constants from the Reaction Path Hamiltonian II: Nonseparable Semi-classical Transition State Theory”, with B. Peters and A.T. Bell, *J. Chem. Phys.*, **121**, 4461 (2004).
100. “Signatures of the Order-Disorder Transition in Copolymers with Quenched Sequence Disorder”, with H.B. Eitouni et al., *Macromolecules.*, **37**, 8487 (2004).
101. “Order-Disorder Transitions in Crosslinked Block Copolymer Solids”, with H.Han et al., *Macromolecules*, **38**, 1277 (2005).
102. “Movies, Measurements, and Modeling – the 3M’s of Mechanistic Immunology”, with C. Witt, S. Raychaudhuri, *J. Exp. Med.*, **201**, 501 (2005).
103. “A Dendronized Polymer is a Single Molecule Glass”, with J. Das et al., *J. Phys. Chem.* **109**, 6535 (2005).
104. “Directed Migration of Positively Selected Thymocytes Visualized in Real Time”, with C. Witt et al., *PLOS Biology*, **3** (6), June (2005).
105. “Phase Segregation on Different Length Scales in a Model Cell Membrane System”, with J. Liu, S.Y. Qi, *J. Phys. Chem. B*, **109**, 19960 (2005).
106. “Chemomechanics of Surface Stresses Induced by DNA Hybridization”, with J. Stachowiak et al., *Langmuir*, **22**, 263 (2006).
107. “Effects of Quenched and Annealed Macromolecular Crowding on Signal Transduction in T Lymphocytes”, with J. Eide, *J. Phys. Chem. B*, **110**, 2318 (2006).
108. “Molecular Flexibility Influences the Stimulatory Ability of Receptor-Ligand Interactions at Cell-Cell Junctions”, with Mark M. Davis et al., *Proc. Natl. Acad. Sci.*, **103**, 4416 (2006). COVER
109. “Simple Models for How Proteins Convert Chemical Energy to Mechanical Work”, with J. Eide, G.F. Oster, *BioPhys. J.*, **90**, 4281 (2006).
110. “Kinetic Pathways of Phase Transitions in Model Lipid Rafts”, with J. Liu, J.T. Groves, *J. Phys. Chem. B*, **110**, 8416 (2006).
111. “Advances in Methods and Algorithms for a Modern Quantum Chemistry Program Package”, with Y. Shao et al., *Phys. Chem. Chem. Phys.*, **8**, 3172 (2006).

112. “Effect of Cross-linking on the Structure and Thermodynamics of Lamellar Block Copolymers”, with J. Das et al., *Macromolecules*, **39**, 4848 (2006).
113. “A Hybrid Deterministic-Stochastic Algorithm for Modeling Cell Signaling Dynamics in Spatially Inhomogenous Environments and Under the Influence of External Fields” with D. Wylie et al., *J. Phys. Chem. B*, **110**, 12749 (2006).
114. “Sensitivity of T cells to Antigen and Antagonism Emerge from the same Molecular Signaling Module”, with D. Wylie et al., *Proc. Natl. Acad. Sci.*, **104**, 5533 (2007).
115. “The Stimulatory Potency of T Cell Antigens is Influenced by the Formation of the Immunological Synapse”, with S. Cemerski et al., *Immunity*, **26**, 345 (2007).
116. “Empty Class II Major Histocompatibility Complex Created by Peptide Photolysis Establishes the Role of DM in Peptide Association”, with G.M. Grotenbreg et al., *J. Biol. Chem.*, **282**, 21425-21436 (2007).
117. “Scaffold Proteins Confer Diverse Regulatory Functions to Signaling Cascades”, with J. Locasale et al., *Proc. Natl. Acad. Sci.*, **104**, 13307 (2007).
118. “Purely Stochastic Binary Cellular Decisions Without Deterministic Instabilities”, with M. Artomov, J. Das, M. Kardar, *Proc. Natl. Acad. Sci.*, **104**, 18958 (2007).
119. “T cell Sensing of Antigen Dose Governs Interactive Behavior with APC – an Integrative Mechanism that Sets a Threshold for T cell Activation”, with S. Henrickson et al., *Nature Immunology*, **9**, 282 (2008).
120. “Tug of war at the exit door”, with M. Dustin, *Immunity*, **28**, 15 (2008).
121. “Regulation of Signal Duration and Statistical Dynamics of Kinase Activation”, with J. Locasale, *PLOS, Comp. Biol.*, **27**;4(6):e1000099 (2008).
122. “How Antigen Quantity and Quality Determines T cell Decisions in Lymphoid Tissues” with H. Zheng et al., *Mol. Cell Biol.*, **28**, 4040 (2008).
123. “The Balance between T Cell Receptor Signaling and Degradation at the Center of the Immunological Synapse is Determined by Antigen Quantity”, with S. Cemerski et al., *Immunity*, **29**, 414 (2008).
124. “How the Thymus Designs an antigen-specific and self-tolerant T cell Repertoire”, with A. Kosmrlj et al., *Proc. Natl. Acad. Sci.*, **105**, 16671 (2008).
125. “Digital Signaling and Hysteresis During Ras Activation in Lymphoid Cells”, with J. Das et al., *Cell*, **136**, 337 (2009).

126. “Origin of Digital and Analog Thresholds Discriminating Positive and Negative Selection of T Cells in the Thymus”, with A. Prasad et al., *Proc. Natl. Acad. Sci.*, **106**, 528 (2009).
127. “Signaling Cascades Modulate the Speed of Signal Propagation through Space”, with C. Govern, *PLOS One*, 4(2), e4639 (2009).
128. “Positive feedback regulation results in spatial clustering and fast spreading of active signaling molecules on a cell membrane”, with J. Das et al., *J. Chem. Phys.*, **130**, 245102 (2009).
129. “Self-assembly of dendronized polymers”, with J. Das et al., *J. Phys Chem B*, **113** (42), 13768 (2009).
130. “Efficient stochastic simulation of reaction–diffusion processes via direct compilation”, with M. Lis et al., *Bioinformatics*, **25**, 2289-2291 (2009).
131. “Thymic Selection of T-Cell Receptors as an Extreme Value Problem”, with A. Kosmrlj et al., *Phys. Rev. Lett.*, **103**, 068103 (2009).
132. “The impact of negative selection on thymocyte migration in the medulla”, with M. Leborgne et al., *Nature Immunology*, **10**, 823-830 (2009).
133. “Stochastic bimodalities in deterministically monostable reversible chemical networks due to network topology reduction”, with M. Artyomov et al., *J. Chem. Phys.*, **131**, 195103 (2009).
134. “Molecular origin and functional consequences of digital signaling and hysteresis during Ras activation in lymphocytes”, with J. Das et al., *Sci. Signal.*, **2** (66) pt2 (2009).
135. “Pairing computation with experimentation: a powerful coupling for understanding T cell signaling”, with J. Das, *Nature Reviews Immunology*, **10**, 59 (2010).
136. “Statistical mechanical concepts in adaptive immunity”, with Andrej Košmrlj, *Ann. Rev. Phys. Chem.*, **61**, 283 (2010).
137. “A Model for Genetic and Epigenetic Regulatory Networks Identifies Rare Pathways for Transcription Factor Induced Pluripotency”, with M. Artyomov et al., *PLOS Comp. Biol.*, **6**(5): e1000785 (2010).
138. “Seeing in Numbers”, *The Scientist*, **24**(3) 40 (2010).
139. “Effects of thymic selection of the T-cell repertoire on HLA class II-associated control of HIV infection”, with A. Kosmrlj et al., *Nature*, **465**, 350 (2010).

140. "Fast on-rates allow short dwell time ligands to activate T cells", with C. Govern et al., *Proc. Natl. Acad. Sci.*, **107**, 8724 (2010).
141. "Only signaling modules that discriminate sharply between stimulatory and non-stimulatory inputs require basal signaling for fast cellular responses", with M. Artyomov et al., *J Chem Phys*, under review (2010).
142. "Polyreactivity increases the affinity of anti-HIV antibodies by heteroligation" with M. Nussenzweig et al., *Nature*, under review (2009).
143. "Dissecting the role of CD4 and CD8 co-receptors in T cell signaling: A puzzle resolved?", with M. Artyomov et al., *Proc. Natl. Acad. Sci.*, under review (2009).

BOOKS:

Edited Book: "Molecular Modeling and Theory in Chemical Engineering", Academic Press, San Diego (2001).

INVITED LECTURES

249. AIChE meeting, November (2010).
248. UT Southwestern seminar, October (2010).
247. Berlin conference, September (2010).
246. Buffalo, September (2010).
245. ICI in Japan August (2010)
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244. Q bio conference, Santa Fe, Aug 2010.
243. July short course in San Antonio (2010).
242. A.K. Chakraborty, "Understanding Adaptive immunity: from statistical physics to clinical data", seminar delivered at the Steele Laboratory, Mass General Hospital, Boston, June (2010).
241. A.K. Chakraborty, "Why individuals with certain genes can control HIV infections", invited lecture at the Rutgers Statistical Physics Meeting, Rutgers, May (2010).
240. A.K. Chakraborty, "Digital Signaling and Hysteresis during Ras activation in Lymphocytes", invited lecture at a workshop on Mathematical Biology, Fields Institute, Toronto, Canada, March (2010).

239. A.K. Chakraborty, ““Understanding Adaptive Immunity: a Crossroad of the Physical, Life, and Engineering Sciences”, Stanley Katz Lectures delivered at the Department of Chemical Engineering, City University of New York, March (2010).
238. A.K. Chakraborty, “Understanding Adaptive Immunity: a Crossroad of the Physical, Life, and Engineering Sciences”, seminar delivered at the Department of Chemical Engineering, Princeton University, February (2010).
237. A.K. Chakraborty, “How T cells see antigen”, invited lecture at the Keystone Symposium on T cell activation, Steamboat Springs, February (2010).
236. A.K. Chakraborty, “Understanding adaptive immunity: a crossroad of physics and biology”, invited lecture at the 75th anniversary meeting of the Indian Physical Society, Kolkata, India, December (2009).
235. A.K. Chakraborty, “Understanding adaptive immunity: A crossroad of the physical, life, and engineering sciences”, seminar delivered in the Department of Chemical Engineering, University of Michigan, Ann Arbor, November (2009).
234. A.K. Chakraborty, “How T cells see antigen”, seminar delivered at the Broad Institute, Cambridge, November (2009).
233. A.K. Chakraborty, “How T cells see antigen: Implications for elite controllers of HIV infection”, seminar delivered at the Center for Engineering and Medicine, Massachusetts General Hospital, Boston, October (2009).
232. A.K. Chakraborty, “Understanding adaptive immunity: A crossroad of physics and biology”, seminar delivered at the Department of Mathematics, MIT, Cambridge, September (2009).
231. A.K. Chakraborty, “How T cells see antigen”, invited lecture at the Sienna Conference on Lymphocyte signaling, Sienna, Italy, September (2009).
230. A.K. Chakraborty, “How T cells see antigen”, invited lecture at the International Systems Biology Conference, Palo Alto, September (2009).
229. A.K. Chakraborty, “Digital signaling in lymphocytes”, SIAM conference, Vancouver, July (2009).
228. A.K. Chakraborty, “Supramolecular complexes in immunology”, invited lecture at the Gordon Research Conference on Supramolecular assemblies, New Hampshire, June (2009).
227. A.K. Chakraborty, “Origin of digital signaling and hysteresis in T cell signaling”, invited lecture at the germinal center conference, Frankfurt, Germany, July (2009).

226. A.K. Chakraborty, "How T cells see antigen", Keynote address, symposium on multiscale modeling of host-pathogen interactions, Pittsburgh, July (2009).
225. A.K. Chakraborty, "How the T cell repertoire is selected and its consequences for elite controllers of HIV", invited lecture at the Ragon symposium on Computational Immunology, Cambridge, June (2009).
224. A.K. Chakraborty, "A model for genetic and epigenetic regulation of high fidelity responses to differentiation cues and stochastic outcomes of reprogramming experiments", Theory seminar, Department of Physics, University of Chicago, Chicago, June (2009).
223. A.K. Chakraborty, "Understanding adaptive immunity: A crossroad of the physical and life sciences", seminar delivered at the James Franck Institute, Department of Physics, University of Chicago, Chicago, June (2009).
222. A.K. Chakraborty, "Understanding Adaptive Immunity: A crossroad of the physical and life sciences", Raman Memorial Lectures, Kolkata, India, May (2009).
221. A.K. Chakraborty, "How the thymus designs a specific, yet degenerate, T cell repertoire", invited lecture at the George Oster Symposium, Berkeley, May (2009).
220. A.K. Chakraborty, "Origin of Digital Signaling in Lymphocytes and its Functional Consequences", invited lecture at the President's Symposium, AAI meeting, Seattle, May (2009).
219. A.K. Chakraborty, "How does our adaptive immune system see antigen", public lecture at the Santa Fe Institute, Santa Fe, April (2009).
218. A.K. Chakraborty, "Origin of digital signaling and hysteresis during T cell receptor signaling", seminar delivered at the Los Alamos National Laboratory, Los Alamos, April (2009).
217. A.K. Chakraborty, "Understanding adaptive immunity: A crossroad of physics and biology", invited lecture at the Department of Computational Biology, University of Pittsburgh, Pittsburgh, March (2009).
216. A.K. Chakraborty, "Understanding adaptive immunity: A crossroad of physics and biology", invited lecture at the American Physical Society Meeting, Pittsburgh, March (2009).
215. A.K. Chakraborty, "Understanding adaptive immunity: A crossroad of physics and biology", seminar delivered at the Rockefeller University, New York, February (2009).
214. A.K. Chakraborty, "How the Thymus designs a specific, diverse, and self-tolerant T cell repertoire", seminar delivered at the Department of Immunology, Washington University Medical School, St. Louis, February (2009).

213. A.K. Chakraborty, "A possible mechanism for signal integration during migration of T cells in lymph nodes", invited lecture at the EMBO workshop on Visualizing Immunity, Marsielle, France, January (2009).
212. A.K. Chakraborty, "Understanding adaptive immunity: A crossroad of the physical, life, and engineering sciences", seminar delivered at the Department of Bioengineering, University of California, Berkeley, January (2009).
211. A.K. Chakraborty, "How the Thymus designs a specific, diverse, and self-tolerant T cell repertoire", invited lecture at the Mini Statistical Mechanics Meeting, Berkeley, January (2009).
210. A.K. Chakraborty, "Molecular Origin and functional consequences of digital signaling and hysteresis during T cell signaling", Immunology seminar, Harvard Medical School, Boston, December (2008).
209. A.K. Chakraborty, "Understanding Adaptive Immunity: A Crossroad of the Physical, Life, and Engineering Sciences", seminar delivered at the chemical engineering department, Tufts University, December (2008).
208. A.K. Chakraborty, "How the Thymus designs the T cell repertoire", invited lecture at the Jane Coffin Childs Foundation Symposium on Computational Biology, Connecticut, October (2008).
207. A.K. Chakraborty, "Molecular Origin and functional consequences of digital signaling and hysteresis during T cell signaling", Catablanco workshop on antigen receptor signaling, Madrid, Spain, October (2008).
206. A.K. Chakraborty, "How the Thymus designs a specific, diverse, and self-tolerant T cell repertoire", seminar delivered at the Department of Immunology, University of Massachusetts Medical School, Worcester, September (2008).
205. A.K. Chakraborty, "How the Thymus designs a specific, diverse, and self-tolerant T cell repertoire", seminar delivered at the UCSF Medical School, Department of Immunology and Microbiology, October (2008).
204. A.K. Chakraborty, "Mechanistic T cell Biology: A Crossroad of Physical Chemistry and Cell Biology", invited lecture at the American Conference on Theoretical Chemistry, Chicago, July (2008).
203. A.K. Chakraborty, "How the Thymus Selects an antigen-specific T cell repertoire", invited lecture at the Telluride Conference on Biological Landscapes, Telluride, July (2008).

202. A.K. Chakraborty, "Signaling during positive and negative selection in the Thymus", invited lecture at the RCAIJSI Immunology Conference, Yokohama, Japan, June (2008).
201. A.K. Chakraborty, "How the Thymus Selects an antigen-specific T cell repertoire", invited lecture at the computational immunology workshop, Pennsylvania State University, June (2008).
200. A.K. Chakraborty, "How T cells see Antigen", invited lecture at Defense Science Research Council, Washington, DC, June (2008).
199. A.K. Chakraborty, "Understanding Adaptive Immunity: A Crossroad of physics and Biology", invited keynote lecture at the 4th International Nanosciences Conference, Istanbul, Turkey, June (2008).
198. A.K. Chakraborty, "Understanding Adaptive Immunity: A Crossroad of physics and Biology", invited lecture at Partners Aids Research Center, MGH, Cambridge, May (2008).
197. A.K. Chakraborty, "How T cells see antigen", seminar for the Boston Area theoretical chemistry series, Boston, April (2008).
196. A.K. Chakraborty, "Frustration and cooperative effects during selection of the T cell repertoire", invited lecture at the Cell Biophysics conference, Les Housches, France, April (2008).
195. A.K. Chakraborty, "Adaptive Immunity: A crossroad of the physical and life sciences", Distinguished Lecture Series in the Life Sciences, National Singapore University, March (2008).
194. A.K. Chakraborty, "How T cells See Antigen", invited lecture at the Biophysical Soc. Meeting, Long Beach, February (2008).
193. A.K. Chakraborty, "How T cells see Antigen", seminar delivered at the Department of Systems Biology, Harvard Medical School, Cambridge, February (2008).
192. A.K. Chakraborty, "Regulation and mis-regulation of the Adaptive Immune Response", invited lecture at the Integrative Cancer Biology Symposium, National Cancer Institute, Washington, November (2007).
19. A.K. Chakraborty, "How T cells See Antigen", invited lecture at the AIChE meeting, Salt Lake, November (2007).
190. A.K. Chakraborty, "Understanding Adaptive Immunity: A Crossroad of the Physical, Life, and Engineering Sciences", invited lecture at the AIChE meeting, Salt Lake, November (2007).

189. A.K. Chakraborty, "Signaling in CD8+ T cells", invited lecture at the workshop on CD8 T cells, Amherst, October (2007).
188. A.K. Chakraborty, "Membrane-proximal Signaling in T cells", invited lecture at International Soft Matter Conference, Aachen, October (2007).
187. A.K. Chakraborty, "Fluctuation – mediated cell decisions." Invited lecture at the workshop on spatial fluctuations in biology, Amsterdam, Netherlands, September (2007).
186. A.K. Chakraborty, "How T cells See Antigen: A Crossroad of the Physical, Life, and Engineering Sciences", invited seminar at the Department of Chemical Engineering, NJIT, New Jersey, September (2007).
185. A.K. Chakraborty, "Understanding Adaptive Immunity: A Crossroad of the Physical, Life, and Engineering Sciences", Keynote lecture at the Physical Chemistry and Chemical Engineering Symposium, Corfu, Greece, September (2007).
184. A.K. Chakraborty, "Multiscale Phenomena in the Adaptive Immune System", invited lecture at the Multiscale Methods in Biology Symposium, London, UK, September (2007).
183. A.K. Chakraborty, "How T cells see Antigen", Immunology seminar delivered at NYU Medical Center, New York, September (2007).
182. A.K. Chakraborty, "Understanding Regulation and Mis-regulation of the Adaptive Immune System", NIH Pioneer Award Symposium, Bethesda, September (2007).
181. A.K. Chakraborty, "Signaling in T cells", invited lecture at the q-Bio Cell Signaling Workshop", Santa Fe, August (2007).
180. A.K. Chakraborty, "How T cells see Antigen", lecture delivered at Biogen Idec, Cambridge, MS, July (2007).
179. A.K. Chakraborty, "Narcissism, Violence, and Self-hate in the Adaptive Immune System", Scientific Horizons Seminar, SAC Investment bank, New York, June (2007).
178. A.K. Chakraborty, "How T cells see Antigen", invited lecture at the Aegean Conference on Lymphocyte Signaling, Rhodes, Greece, June (2007).
177. A.K. Chakraborty, "Membrane-Proximal TCR Signaling", invited lecture at the Conference on Lymphocyte Signaling, Siena, Italy, May (2007).
176. A.K. Chakraborty, "Understanding Adaptive Immunity: A Crossroad of Statistical Physics and Cell Biology", invited lecture at the Rutgers Statistical Mechanics meeting, Rutgers, May (2007).

175. A.K. Chakraborty, "How T cells See Antigen", invited lecture (by student vote) at the Chemical Biophysics Symposium, University of Toronto, Toronto, April (2007).
174. A.K. Chakraborty, "Understanding Adaptive Immunity: A Crossroad of the Physical, Biological, and Engineering Sciences", seminar delivered at the Department of Chemical Engineering, MIT, Cambridge, March (2007).
173. A.K. Chakraborty, "How T cells See Antigen: A Crossroad of Statistical Mechanics and Cell Biology", invited lecture at the Mini Statistical Mechanics Meeting, Berkeley, January (2007).
172. A.K. Chakraborty, "How T cells see Antigen", seminar delivered at the Department of Chemical Engineering, University of Rhode Island, Kingston, December (2006).
171. A.K. Chakraborty, "Understanding the Adaptive Immune Response: A Crossroad of Physics and Biology", seminar delivered at the Department of Physics, MIT, Cambridge, December (2006).
170. A.K. Chakraborty, "How T cells See Antigen", seminar delivered at the Department of Physics, Brandeis University, Waltham, October (2006).
169. A.K. Chakraborty, "T Lymphocyte Activation: A Quintessential Multi-scale modeling problem", Invited lecture at the ICBN Conference, Santa Barbara, September (2006).
168. A.K. Chakraborty, "How T cells "See" Antigen", invited lecture at the CCB ICAM workshop, Washington University, St. Louis, May (2006).
167. A.K. Chakraborty, "How T cells "See" Antigen", seminar delivered at the Division of Engineering and Applied Sciences, Harvard University, Cambridge, April (2006).
166. A.K. Chakraborty, "Models for Membrane-Proximal and Intracellular Signaling in T cells", seminar delivered at the Department of Mathematics, University of Utrecht, Netherlands, April (2006).
165. A.K. Chakraborty, "How T cells Detect Antigen", invited lecture at the Dutch Academy of Sciences Conference on Biology: From electrons to cells, Amsterdam, April (2006).
164. A.K. Chakraborty, "How T cells See Antigen", invited talk at Merrimack Pharmaceuticals, Cambridge, March (2006).
163. A.K. Chakraborty, "How T cells "See" Antigen", seminar delivered at the Biological Engineering Department, MIT, Cambridge, March (2006).
162. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", Chemical Biology and Biophysics Seminar, UCSF Medical School, San Francisco, February (2006).

161. A.K. Chakraborty, "How T cells See Antigen", invited lecture at the annual meeting of the Biophysical Society, Salt Lake, February (2006).
160. A.K. Chakraborty, "How T cells See Antigen", seminar delivered at the Department of Chemical Engineering, Lehigh University, Pennsylvania, February (2006).
159. A.K. Chakraborty, "T cell sensitivity to Antigen", seminar delivered at the Kimmell Cancer Research Institute, Thomas Jefferson University, Philadelphia, January (2006).
158. A.K. Chakraborty, "How T cells see Antigen", invited lecture at the Keystone Symposium on Lymphocyte Biology, Keystone, January (2006).
157. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", Biophysics seminar delivered at Brandeis University, Waltham, December (2005).
156. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", Professional Progress Award lecture, AIChE meeting, Cincinnati, November (2005).
155. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", seminar delivered at the Indian Institute of Technology, Powai, India, November (2005).
154. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", Doraiswamy Lecture, National Chemical Laboratory, Pune, India, November (2005).
153. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", Biophysics seminar (campus-wide), Caltech., Pasadena, October (2005).
152. A.K. Chakraborty, "How T Cells Recognize Antigen", Wilber Seminar, Departments of Chemistry and Chemical Engineering, Rice University, Houston, October (2005).
151. A.K. Chakraborty, "Multiscale Models to study signal integration in T cells", invited lecture at a workshop on Multiscale Models in Biology, Snowbird, October (2005).
150. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", Doraiswamy Lecture, Department of Chemical Engineering, Iowa State University, Ames, September (2005).
149. A.K. Chakraborty, "Computational Tools to Study T cell Migration Strategies", invited lecture at HHMI workshop on Lymphocyte migration, Washington D.C., September (2005).
148. A.K. Chakraborty, "Intercellular Communication in Adaptive Immunity", invited lecture at the Indian Institute of Technology, Kanpur, India, August (2005).

147. A.K. Chakraborty, "Sensors: Lessons from T cell Biology", Keynote Lecture, ICCE 12, Spain, August (2005).
146. A.K. Chakraborty, "Dendronized Polymers as Building Blocks for Nanotechnology", invited lecture at the ACS meeting, Washington D.C., August (2005).
145. A.K. Chakraborty, "The Role of Spatial Organization on T cell Signaling and Activation", invited lecture at the FASEB meeting on *Lymphocytes and the Immune System: Molecular, Cellular and Integrative Mechanisms*, Tuscon, July (2005).
144. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", invited lecture at the Rutgers Statistical Mechanics Meeting, Rutgers, May (2005).
143. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", seminar in the Department of Chemical Engineering, Texas Tec. University, Lubbock, April (2005).
142. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", seminar in the Department of Chemical Engineering, University of Washington, Seattle, February (2005).
141. A.K. Chakraborty, "T Cell signaling: A Spatially Organized Catalytic Reactor", invited lecture at the ACS meeting, San Diego, April (2005).
140. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", seminar in the Department of Chemical Engineering, University of California, Santa Barbara, February (2005).
139. A.K. Chakraborty, "Can chemical engineers contribute significantly to Immunology?", seminar delivered at the 50th Anniversary of the Department of Chemical Engineering, University of Colorado, Boulder, February (2005).
138. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", Engineering Foundation Endowed Lectureship, University of Texas, Austin, January (2005).
137. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", seminar delivered in the Department of Pathology, Washington University Medical School, St. Louis, December (2004).
136. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", seminar delivered in the Immunology Department, Johns Hopkins Medical School, Baltimore, November (2004).

135. A.K. Chakraborty, "Listening to Conversations between Cells in the immune System: Plenty of Room at the Bottom", invited lecture at the AIChE meeting, Austin, November (2004).
134. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", seminar delivered in the Department of Chemical Engineering, Stanford University, Stanford, November (2004).
133. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", Physical BioSciences Division Seminar, LBNL, Berkeley, October (2004).
132. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", seminar delivered in the Department of Chemical Engineering, MIT, Cambridge, October (2004).
131. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", seminar delivered at the Institute for Physical Science and Technology, University of Maryland, October (2004).
130. A.K. Chakraborty, "Regulation of TCR Signaling by Spatial Patterning and Localization of Molecular Components", Division of Immunology, University of California, Berkeley, September (2004).
129. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", seminar delivered at the Bioinformatics and Computational Biology Series, Duke University Medical School, September (2004).
128. A.K. Chakraborty, "Spatial Patterns of Receptors can Regulate Signaling in T cells", lecture at SAMSI workshop on Computational Immunology, Duke University, September (2004).
127. A.K. Chakraborty, "Integration of In silico and In vitro Experiments to Study T cell Signaling", invited lecture at Banbury Center Workshop, Cold Spring Harbor Laboratory, September (2004).
126. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", seminar delivered at the Centers for Health Research, Raleigh, September (2004).
125. A.K. Chakraborty, "How Cells in the Immune System Communicate: A Crossroad of Physical Chemistry and Cell Biology", seminar delivered in the Department of Chemistry, U.C. Berkeley, September (2004).
124. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", seminar delivered at the Dept. of Chemical and Biomolecular Engineering, University of Illinois, Urbana, August (2004).

123. A.K. Chakraborty, "Studying Intercellular Communication in the Immune System Using Statistical Mechanics", lectures delivered at the Summer School on Computational Chemistry, LLNL, Livermore, July (2004).
122. A.K. Chakraborty, "Computer Simulations in Cell Biology", invited lecture at the Computational Chemistry Gordon Conference, New Hampshire, July (2004).
121. A.K. Chakraborty, "Intercellular Communication in the Immune System: Lessons for Designing Materials for Biosensors", Third International Conference on Modeling and Simulation of Materials, Sicily (Italy), May (2004).
120. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", invited lecture at the 91st Statistical Mechanics Meeting, Rutgers, New Jersey, May (2004).
119. A.K. Chakraborty, "How T Cells Communicate with Antigen Presenting Cells", invited lecture at the Ohio State University, Institute for Computational Biology, May (2004).
118. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", seminar delivered at the Biomedical Engineering Department, Johns Hopkins University, Baltimore, April (2004).
117. A.K. Chakraborty, "Communication Between Membranes of Cells in the Immune System", invited lecture at the APS March Meeting, Montreal, March (2004).
116. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", Merck Distinguished Lectures, Rutgers University, New Jersey, March (2004).
115. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", Trotter lectures, University of Tennessee, Knoxville, February (2004).
114. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", seminar delivered at the Department of Chemistry, Harvard University, Cambridge, February (2004).
113. A.K. Chakraborty, "Taking Lessons from Biology for Nanotechnology", invited lecture at the AIChE annual meeting, San Francisco, November (2003).
112. A.K. Chakraborty, "Biomolecular Nanomechanics", Invited lecture at the Nano engineering Symposium, ASME, Palo Alto, September (2004).
111. A.K. Chakraborty, "Sampling Catalytic Reaction Paths with Electronic Structure Calculations on the Fly", invited lecture at a CECAM workshop, Lyon, France, September (2003).

110. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", invited lecture at Institut Pierre et Marie Curie, Paris, France, September (2003).
109. A.K. Chakraborty, "How T cells Communicate with Antigen Presenting Cells", invited Lecture at the Department of Immunology, INSERM, Toulouse, France, September (2003).
108. A.K. Chakraborty, "Non-Equilibrium Phenomena at T cell/APC Junctions", keynote lecture at the Conference on Non-Equilibrium Thermodynamics, Princeton, August (2003).
107. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", invited lecture at a CECAM workshop on Cellular Recognition and Molecular Motors, Lyon, France, July (2003).
106. A.K. Chakraborty, "The Immunological Synapse is an Adaptive Controller that Balances TCR Signaling and Degradation", invited lecture at the FASEB summer meeting on Lymphocyte Biology, Tuscon, AZ, June (2003).
105. A.K. Chakraborty, "Intercellular Communication in the Adaptive Immune System", invited lecture to be delivered at the Oberwolfach Conference on Mathematical Biology, Oberwolfach, Germany, May (2003).
104. A.K. Chakraborty, "The Immunological Synapse: A Crossroad of Physical Chemistry and Cell Biology", seminar delivered at the Department of Chemical Engineering, University of Massachusetts, Amherst, October (2002).
103. A.K. Chakraborty, "Information Transfer at the Immunological Synapse: A Crossroad of Physical Chemistry and Cell Biology", seminar delivered at the Department of Chemical Engineering, University of California, Davis, October (2002).
102. A.K. Chakraborty, "Information Transfer at the Immunological Synapse: A Crossroad of Physical Chemistry and Cell Biology", seminar delivered at the Department of Chemical Engineering, University of Pennsylvania, Philadelphia, October (2002).
101. A.K. Chakraborty, "The Immunological Synapse: Physical Chemistry Meets Cell Biology", seminar delivered at the Department of Chemical Engineering, Rensselaer Polytechnic Institute, Troy, September (2002).
100. A.K. Chakraborty, "The Immunological Synapse: A Crossroad of Physical Chemistry and Cell Biology", seminar delivered at the Department of Chemistry, Georgia Institute of Technology, Atlanta, September (2002).
99. A.K. Chakraborty, "The Immunological Synapse: A Crossroad of Physical Chemistry and Cell Biology", seminar delivered at the Department of Chemistry, Emory University, Atlanta, September (2002).

98. A.K. Chakraborty, "Immunological Synapse Formation: A Crossroad of Physical Chemistry and Cell Biology", invited lecture at the MTNS meeting, Notre Dame, August (2002).
97. A.K. Chakraborty, "Immunological Synapse Formation: A Crossroad of Physical Chemistry and Cell Biology", invited lecture at the Liblice Conference on the Statistical Mechanics of Liquids, Liblice, Czech Republic, June (2002).
96. A.K. Chakraborty, "A Model for Immunological Synapse Formation", School of Medicine, Duke University, Durham, May (2002).
95. A.K. Chakraborty, "Membrane Mechanics and Cellular Recognition", invited lecture at the School on Nanoscale/Molecular Mechanics, Maui, May (2002).
94. A.K. Chakraborty, "The Immunological Synapse: A Crossroad of Physical Science and Cell Biology", Department of Physics, University of California, San Diego, April (2002).
93. A.K. Chakraborty, "The Immunological Synapse: A Crossroad of Physical Chemistry and Cell Biology", Department of Chemical Engineering, University of Missouri, Rolla, March (2002).
92. A.K. Chakraborty, "A Physical Chemist thinks about the Immunological Synapse", Department of Immunology and Pathology, Washington University School of Medicine, St. Louis, March (2002).
91. A.K. Chakraborty, "Statistical Mechanics of Immunological Synapse Formation", invited lecture at the Mini Statistical Mechanics Meeting, Berkeley, January (2002).
90. A.K. Chakraborty, "Reaction Kinetics, Membrane Physics, and Cell-Cell Recognition", invited talk at the AIChE meeting, Reno, Nevada, November (2001).
89. A.K. Chakraborty, "Immunological Synapse Formation: A Crossroad of Physical Chemistry and Cell Biology", seminar delivered at the Chemical Engineering Department, University of California, Riverside, October (2001).
88. A.K. Chakraborty, "Immunological Synapse Formation: A Crossroad of Physical Chemistry and Cell Biology", seminar delivered at the Chemical Engineering Department, Ohio State University, Columbus, October (2001).
87. A.K. Chakraborty, "Immunological Synapse Formation: A Crossroad of Physical Chemistry and Cell Biology", seminar delivered at the Lymphocyte Biology Laboratory, National Institutes of Health, Bethesda, September (2001).

86. A.K. Chakraborty, "Immunological Synapse Formation: A Crossroad of Physical Chemistry and Cell Biology", seminar delivered at the Chemical Engineering Department, University of California, Berkeley, September (2001).
85. A.K. Chakraborty, "Immunological Synapse Formation: A Crossroad of Physical Chemistry and Cell Biology", seminar delivered at the Levich Institute, City College of the City University of New York, New York, September (2001).
84. A.K. Chakraborty, "Immunological Synapse Formation: A Crossroad of Physical Chemistry and Cell Biology", seminar delivered at the Chemical Engineering Department, Princeton University, Princeton, September (2001).
83. A.K. Chakraborty, "Effect of TCR-MMC-peptide Binding Kinetics on Immunological Synapse Formation", America Chemical Society Meeting, Chicago, August (2001).
82. A.K. Chakraborty, "Interfacial Forces and Biopolymer Binding", American Chemical Society Meeting, Chicago, August (2001).
81. A.K. Chakraborty, "Some Mathematical Problems in Recognition", Applied Mathematics Division, Lawrence Berkeley National Laboratory, Berkeley, May (2001).
80. A.K. Chakraborty, "Synaptic Pattern Formation during Cell-Cell Recognition", A.C.S. Symposium on Colloid and Interfacial Science, Pittsburgh, PA. June (2001).
79. A.K. Chakraborty, "Macromolecules at Interfaces: Recognition in Biology and Biomimetic Systems", DOE Workshop on Challenges and Opportunities in Macromolecules at Interfaces, Santa Fe. January (2001).
78. A.K. Chakraborty, "Synaptic Pattern Formation During Cell-Cell Recognition", Department of Chemistry, Stanford Chemistry. October (2000).
77. A.K. Chakraborty, "Biomimetic Recognition Between Polymers and Surfaces", U.S.-China Chemical Engineering Meeting, Beijing, China. September (2000).
76. A.K. Chakraborty, "Self-Assembly Processes of Disordered Heteropolymers", Polymer Physics Gordon Conference, New London, Connecticut. July (2000).
75. A.K. Chakraborty, "Self-Assembly Processes of Disordered Heteropolymers", Northwestern University, Illinois. April (2000).
74. A.K. Chakraborty, "Self-Assembly Processes of Disordered Heteropolymers in Solution and at Interfaces", R.W. Vaughan Memorial Lectures, Caltech, Pasadena, California. April (2000).
73. A.K. Chakraborty, "Self-Assembly Processes of Disordered Heteropolymers", invited lecture to Federal Funding Agencies, Washington, DC. December (1999).

72. A.K. Chakraborty, "Biomimetic Recognition Between Polymers and Surfaces: Taking Steps Toward the Molecular Engineering of Sensors, Separation Processes, and Viral Inhibitors", featured speaker at the National Academy of Engineering, Frontiers of Engineering Meeting, Irvine, California. October (1999).
71. A.K. Chakraborty, "Biomimetic Recognition Between Random Heteropolymers and Multifunctional Surfaces", seminar delivered at the Dept. of Chem. Engr., Columbia University, New York. September (1999).
70. A.K. Chakraborty, "Biomimetic Recognition Between Random Heteropolymers and Multifunctional Surfaces", seminar delivered at the Dept. of Chem. Engr., University of Napoli, Napoli, Italy. September (1999).
69. A.K. Chakraborty, "Biomimetic Recognition Between Random Heteropolymers and Multifunctional Surfaces", invited talk delivered at the CECAM Workshop on Theory and Simulation of Polymers, Lyon, France. September (1999).
68. A.K. Chakraborty, "Self-Assembly Processes of Disordered Heteropolymers", invited lecture delivered at American Physical Society Meeting, Minneapolis, Minnesota. March (1999).
67. A.K. Chakraborty, "Biomimetic Recognition Between Random Heteropolymers and Multifunctional Surfaces", invited talk delivered at Michigan State, East Lansing. December (1998).
66. A.K. Chakraborty, "Biomimetic Recognition Between Random Heteropolymers and Multifunctional Surfaces", invited talk delivered at the AIChE Meeting, Miami, Florida. November (1998).
65. A.K. Chakraborty, "A Decade of Experience in Teaching Molecular Modeling at Berkeley", plenary talk delivered at the AIChE meeting, Miami. November (1998).
64. A.K. Chakraborty, "Biomimetic Recognition Between Random Heteropolymers and Multifunctional Surfaces", seminar delivered at the Department of Chemical Engineering, University of California, Santa Barbara. November (1998).
63. A.K. Chakraborty, "Biomimetic Recognition Between Random Heteropolymers and Multifunctional Surfaces", seminar delivered at the Department of Chemical Engineering, University of California, Los Angeles. November (1998).
62. A.K. Chakraborty, "Biomimetic Recognition Between Random Heteropolymers and Multifunctional Surfaces", seminar delivered at the Department of Chemical Engineering, Pennsylvania State, State College. November (1998).

61. A.K. Chakraborty, "Biomimetic Recognition Between Random Heteropolymers and Multifunctional Surfaces", seminar delivered at the Department of Chemical Engineering, Stanford University, Stanford. October (1998).
60. A.K. Chakraborty, "Biomimetic Recognition Between Random Heteropolymers and Multifunctional Surfaces", seminar delivered at the Department of Chemical Engineering, University of Illinois, Urbana. October (1998).
59. A.K. Chakraborty, "Biomimetic Recognition Between Random Heteropolymers and Multifunctional Surfaces", seminar delivered at the Department of Chemistry, University of California, Berkeley. September (1998).
58. A.K. Chakraborty, "Random Heteropolymer Adsorption", seminar delivered at the Department of Chemistry, University of Wisconsin, Madison. April (1998).
57. A.K. Chakraborty, "Interfacial Thermodynamics of Random Heteropolymers", invited paper at the ACS meeting, Dallas, Texas. April (1998).
56. A.K. Chakraborty, "Adsorption of Random Heteropolymers on Multifunctional Disordered Surfaces: Recognition Due to Statistical Pattern Matching", invited paper at the March meeting of the APS, Los Angeles, California. March (1998).
55. A.K. Chakraborty, "Field - Theoretic Modeling of Random Heteropolymers", invited lecture at the ACS workshop on Polymer Modeling, Isle of Palms, South Carolina. March (1998).
54. A.K. Chakraborty, "Molecular Modeling of Polymers and Adsorption", keynote lecture at the NSF workshop on Quantum Chemistry and Molecular Simulations: Fundamentals and Applications, Arlington, Virginia. November (1997).
53. A.K. Chakraborty, "Statistical Pattern Matching Between Random Heteropolymers and disordered Surfaces", invited lecture at the ACS regional meeting, Irvine, California. October (1997).
52. A.K. Chakraborty, "Gianni Astarita: The Scientist and the Man", invited lecture at the Astarita Memorial Symposium, University of Delaware, Newark, Delaware. October (1997).
51. A.K. Chakraborty, "Interfacial Behavior of Random Heteropolymers", invited lecture at the Dow Chemical Company, Midland, Michigan. August (1997).
50. A.K. Chakraborty, "NO_x Decomposition in Cu-ZSM-5: Computational Studies", invited paper delivered at the ACS Meeting, San Francisco, California. April (1997).

49. A.K. Chakraborty, "Interfacial Behavior of Random Heteropolymers", seminar delivered at North Carolina State University, Raleigh, North Carolina. February (1997).
48. A.K. Chakraborty, "Interfacial Behavior of Random Heteropolymers", seminar delivered at Carnegie Mellon University, Pittsburgh, Pennsylvania. December (1996).
47. A.K. Chakraborty, "Interfacial Behavior of Random Heteropolymers", seminar delivered at the University of Massachusetts, Polymer Science, Amherst, Massachusetts. November (1996).
46. A.K. Chakraborty, "Interfacial Behavior of Random Heteropolymers", seminar delivered at the University of Michigan, Ann Arbor, Michigan. November (1996).
45. A.K. Chakraborty, "Interfacial Behavior of Random Heteropolymers", seminar delivered at the University of Massachusetts, Amherst, Massachusetts. October (1996).
44. A.K. Chakraborty, "Random Heteropolymers Near 2-D and 3-D Random Manifolds", invited paper at the European Polymer Federation Meeting, Crete, Greece. October (1996).
43. A.K. Chakraborty, "Theoretical Studies of Polymer-Solid Interfaces", seminar delivered at the Wilton Research Center, ICI - Polyester, U.K. October (1996).
42. A.K. Chakraborty, "Interfacial Behavior of Random Heteropolymers", seminar delivered at the Johns Hopkins University, Baltimore, Maryland. September (1996).
41. A.K. Chakraborty, "Interfacial Behavior of Random Heteropolymers", seminar delivered at the University of California, Berkeley, California. August (1996).
40. A.K. Chakraborty, "Electronic Structure and Adsorption Behavior of ZSM-5 Zeolites: Computational Studies", invited lecture delivered at the Catalysis Gordon Conference, New Hampshire. June (1996).
39. A.K. Chakraborty, "Interfacial Behavior of Random Heteropolymers", seminar delivered at the University of California, Los Angeles, CA. March (1996).
38. A.K. Chakraborty, "Interfacial Behavior of Random Heteropolymers", seminar delivered at CCNY, New York. March (1996).
37. A.K. Chakraborty, "Interfacial Behavior of Random Heteropolymers", seminar delivered at Polytechnic University, New York. March (1996).
36. A.K. Chakraborty, "Interfacial Behavior of Random Heteropolymers", seminar delivered at Princeton University, Princeton, N.J. February (1996).

35. A.K. Chakraborty, "Interfacial Behavior of Random Heteropolymers", seminar delivered at the Polymer Processing Science and Technology Program, MIT, Cambridge, MA. February (1996).
34. A. K. Chakraborty, "Adhesion of Random Block Copolymers to Metal Surfaces", invited paper at the MRS meeting, San Francisco, CA. April (1995).
33. A.K. Chakraborty, "Engineering Research, Teaching and Innovation in 2020: The Impact of Advances in Computer Technology", invited lecture at the EPIIC Conference, Boston. MA. March (1995).
32. A.K. Chakraborty, "Polymers Near Strongly Interacting Surfaces: Effects of Chain Architecture, and Implications for Adhesion", seminar delivered at the Massachusetts Institute of Technology, Cambridge, MA. September (1994).
31. A.K. Chakraborty, "Polymers Near Strongly Interacting Surfaces: Effects of Chain Architecture, and Implications for Adhesion", seminar delivered at Tulane University, New Orleans, LA. September (1994).
30. A.K. Chakraborty, "Polymer-Metal Interfaces: Taking Steps Toward the Molecular Design of Adhesives", invited lecture at the Gordon Research Conference on Adhesion Science and Technology, Tilton School, NH. August (1994).
29. A.K. Chakraborty, "Diffusion in Acidic Zeolites", seminar delivered at the University of Southern California, Los Angeles, CA. February (1994).
28. A.K. Chakraborty, "Diffusion in Technologically Relevant Disordered Media", Allan P. Colburn Lecture, University of Delaware, Newark, DE. October (1993).
27. A.K. Chakraborty, "Theoretical Studies of Polymer-Metal Interfaces ", ICI Research, Runcorn, U.K. October (1993).
26. A.K. Chakraborty, "Diffusion in Disordered Media: Ion Diffusion in Acidic Zeolites", seminar delivered at Purdue University, West Lafayette, IN. September (1993).
25. A.K. Chakraborty, "Theoretical Studies of the Structure and Electronic Properties of the Acidic Site in H-ZSM-5", invited paper at the American Catalysis Society Meeting, Pittsburgh, PA. April (1993).
24. A.K. Chakraborty, "Polymers on the Move at Surfaces", seminar delivered at The University of California, Los Angeles, CA. March (1993).
23. A.K. Chakraborty, "Polymers on the Move at Surfaces", seminar delivered at the Department of Chemical Engineering, California Institute of Technology, Pasadena, CA. October (1992).

22. A.K. Chakraborty, "Near- Surface Structure and Dynamics at Strongly Interacting Polymer- Solid Interfaces" seminar delivered at the IBM Almaden Research Center, San Jose, CA. June (1992).
21. A.K. Chakraborty, "Fundamental Studies toward Improved Polymer/Metal Adhesion", invited lecture at the U.S. - France Workshop on High Performance Polymers, Annecy, France. June (1992).
20. A.K. Chakraborty, "Glassy Behavior at Polymer- Solid Interfaces", invited paper at the University of California Conference on Statistical Mechanics", Los Angeles, CA. April (1992).
19. A.K. Chakraborty, "Chain Conformation and Dynamics at Strongly Interacting Polymer - Solid Interfaces", seminar delivered at Cornell University, Ithaca, NY. February (1992).
18. A.K. Chakraborty, "Near- Surface Structure and Dynamics of Polymer- Metal Interfaces", seminar delivered at the Pennsylvania State University, College Park, PA. October (1991).
17. A.K. Chakraborty, "Progress and Future Directions in the Theory of Strongly Interacting Polymer- Solid Interfaces", invited paper at the International Conference on Polymer-Solid Interfaces, Namur, Belgium. September (1991).
16. A.K. Chakraborty, "Near- Surface Structure and Dynamics of Polymer - Metal Interfaces", seminar delivered at The University of California, Santa Barbara, CA. May (1991).
15. A.K. Chakraborty, "Near- Surface Structure of Polymer- Metal Interfaces", seminar delivered at the Lawrence Berkeley Laboratory, Berkeley, CA. April (1991).
14. A.K. Chakraborty, "Near- Surface Structure of Polymer- Metal Interfaces", seminar delivered at the University of Notre Dame, South Bend, IN. February (1991).
13. A.K. Chakraborty, "Near- Surface Structure of Polymer- Metal Interfaces", seminar delivered at the University of Florida, Gainesville, FL. February (1991).
12. A.K. Chakraborty, "Theoretical Studies of Polymer - Metal Interfaces", seminar delivered at the Dexter Corporation, Pittsburgh, CA. January (1991).
11. J.S. Shaffer, A.K. Chakraborty, "Energetics and Near- Surface Structure of Polymer-Metal Interfaces", invited paper at the ACS meeting, Washington, D.C. August (1990).
10. A.K. Chakraborty, "Near - Surface Structure of Polymer - Metal Interfaces" invited lecture at Air Products and Chemicals, Allentown, PA. July (1990).

9. A.K. Chakraborty, "Near - Surface Structure of Polymer - Metal Interfaces", invited poster at the Gordon Conference on Polymer Physics, Newport, RI. July (1990).
8. A.K. Chakraborty, "Near - Surface Structure of Polymer - Metal Interfaces", invited paper at the Spring Meeting of the MRS, San Francisco, CA. April (1990).
7. A.K. Chakraborty, "Organic Oligomers at Jellium Surfaces: A Density Functional Study", seminar at the Department of Chemical Engineering & Materials Science, University of Minnesota, Minneapolis, MN. August (1989).
6. A.K. Chakraborty, "Fundamental Studies of Polymer-Metal Interfaces", seminar delivered at the Raychem Corporation, Menlo Park, CA. May (1989).
5. A.K. Chakraborty, "Fundamental Studies of Polymer-Metal Interfaces", seminar delivered at the IBM Almaden research center, San Jose, CA. April (1989).
4. A.K. Chakraborty, "Theoretical Studies of Polymer-Metal Interfaces", seminar delivered at the Monsanto Chemical Company, Springfield, MA. January (1989).
3. A.K. Chakraborty, "A Molecular View of Acid Gas Separation Processes and Polymer-Metal Adhesion Phenomena", seminar delivered at the University of California, Berkeley, CA. September (1988).
2. A.K. Chakraborty, "Substituent Effects in Amine - CO₂ Reactions: Applications to Acid Gas Separations", seminar delivered at the California Institute of Technology, Pasadena, CA. March (1987).
1. A.K. Chakraborty, "A Molecular Basis for Substituent Effects in Amine-CO₂ Reactions: Applications to Acid Gas Separations", seminar delivered at Exxon Research and Engineering Company, Anandale, NJ. October (1986).