

2019 - Sustainable Industrial Processing Summit & Exhibition

2019 SIPS



**ANGELL
INTERNATIONAL
SYMPOSIUM**

23 - 27 October 2019, Cyprus

**Prof. Austen ANGELL
Publications**

2/7/19

COMPLETE PUB LIST

C. AUSTEN ANGELL

1. "A Technique for the Measurement of Diffusion Coefficients in Molten Salts," C. A. Angell and J. O'M. Bockris, *J. Scientific Instruments* 35, 458-461 (1958).
2. "Self-Diffusion in Molten Salts: Cd in CdCl₂-KCl," J. O'M. Bockris and C. A. Angell, *Electrochim. Acta* 1, 308-17 (1959).
3. "Self-Diffusion and Electrical Conductance Measurements on Solutions of Cadmium in Molten Cadmium Chloride," C. A. Angell and J. W. Tomlinson, offprinted from the Dis. Faraday Soc. No. 32 (1962).
4. "Success of Free Volume Model for Transport in Fused Salts," C. A. Angell, *J. Phys. Chem.*, 68, 218 (1964).
5. "Free Volume Model for Transport in Fused Salts: Electrical Conductance in Glass-Forming Nitrate Melts," C. A. Angell, *J. Phys. Chem.*, 68, 1917 (1964).
6. "A Test of Polarized Electrode Methods for the Study of Diffusion in Fused Salts," C. A. Angell and J. W. Tomlinson, Proceedings of the First Australian Conference held in Sydney, published as the Proceedings in Electrochemistry (1964).
7. "Diffusion-Conductance Relations and Free Volume in Molten Salts," C. A. Angell, *J. Phys. Chem.*, 69, 399 (1965).
8. "Electrical Conductance of Concentrated Aqueous Solutions and Molten Salts: Correlation Through Free Volume Transport Model," C. A. Angell, *J. Phys. Chem.*, 69, 2137 (1965).
9. "Electrical Conductivity of Fused Potassium Nitrate," C. A. Angell, *J. Electrochem. Soc.*, 112, 956 (1965).
10. "Effect of Pressure on the Electrical Conductance and Glass-Transition Temperature of Molten Nitrates," C. A. Angell, L. J. Pollard and W. Strauss, *J. Chem. Phys.*, 43, 2899-2900 (1965).
11. "Self-Diffusion in Molten Lead and Thallous Chlorides," C. A. Angell and J. W. Tomlinson, *Trans. Faraday Soc.*, 61, 2312 (1965).
12. "Sulfate and Sulfate-Chloride Glasses," C. A. Angell, *J. Am. Ceramic Soc.*, 48, 540 (1965).
13. "The Water Content of a Heat-Treatment Salt Bath," C. A. Angell, J. A. Corbett, and R. C. Gifkins, *J. Aust. Inst. Met.*, 10, (4), 335 (1965).
14. "A New Class of Molten Salt Mixtures. The Hydrated Dipositive Ion as Independent Cation Species," C. A. Angell, *J. Electrochem. Society*, 112, 1224-27 (1965).
15. "New Compounds of the Type Mg(H₂O)₆MCl₄ (M=Fe, Co, Cu, Zn)," D. M. Gruen and C. A. Angell, *Inorg. Nuc. Chem. Letters*, 2, 75 (1966).
16. "Simple Two Magnetic Disc Models of Ionic Liquids," C. A. Dimensional. Angell and D. M. Gruen, *J. Chem. Educ.*, 43, 194 (1966).
17. "Short Range Order in Fused Salts. I. Coordination States of Nickel(II) in Molten Zinc Chloride-Potassium Chloride Mixtures," C. A. Angell and D. M. Gruen, *J. Phys. Chem.*, 70, 1601 (1966).
18. "On the Importance of the Metastable Liquid State and Glass Transition Phenomenon to Transport and Structure Studies in Ionic Liquids. I. Transport Properties," C. A. Angell, *J. Phys. Chem.*, 70, 2793 (1966).
19. "Octahedral-Tetrahedral Coordination Equilibria of Ni(II) and Cu(II) in Concentrated Aqueous Electrolyte Solutions," C. A. Angell and D. M. Gruen, *J. Amer. Chem. Soc.*, 88, 5192 (1966).
20. "Free Volume-Entropy Interpretation of the Electrical Conductance of Aqueous Electrolyte Solutions in the Concentrated Range 2-20N," C. A. Angell, *J. Phys. Chem.*, 70, 3988 (1966).
21. "Viscous Flow and Electrical Conductance in Ionic Liquids: Temperature and Composition Dependence in the Light of the Zero Mobility Concept," C. A. Angell, *J. Chem. Phys.*, 46, 4673 (1967).

22. "Concentrated Electrolyte Solution Transport Theory: Directly Measured Glass Temperatures and Vitreous Ice." C. A. Angell, E. J. Sare and R. D. Bressel. *J. Phys. Chem.*, 71, 2759 (1967).
23. "Fundamental Limitations on the Low Temperature Operation of Electrolytic Devices," C. A. Angell, *J. Electrochem. Soc.*, 114, 1033 (1967).
24. "Octahedral and Tetrahedral Coordination States of Cobalt(II) in Molten Zinc Chloride-Aluminum Chloride Mixtures," C. A. Angell and D. M. Gruen, *Inorg. and Nuc. Chem.*, 29, 2243 (1967).
25. "Oxide Glasses in the Light of the **Ideal Glass Concept**. I. General Aspects: Ideal and Non-Ideal Transitions," C. A. Angell, *J. Am. Ceram. Soc.*, 51, 117-124 (1968).
26. "Oxide Glasses in the Light of the Ideal Glass Concept. II. Some Interpretations by Reference to Simple Ionic Glass Behavior", C. A. Angell, *J. Am. Ceram. Soc.*, 51, 124 (1968).
27. "**Liquid-Liquid Immiscibility** in Common Aqueous Salt Solutions at Low Temperatures," C. A. Angell and E. J. Sare, *J. Chem. Phys.*, 49, (10) 4713 (1968).
28. "Transport in Molten Salts Under Pressure. I. Glass-Forming Nitrate Melts," C. A. Angell, **L. J. Pollard** and W. Strauss, *J. Chem. Phys.*, 50, 2694 (1969).
29. "Transport in Low-melting Molten Salt Systems," in *Molten Salts; Characterization and Analysis*, C. A. Angell and C. T. Moynihan, Ed. G. Mamantov. Marcel Dekker, New York, June 1969, p. 315.
30. "Conductance, Viscosity, Density, PMR Spectra, and Glass Transition Temperatures of Calcium Nitrate Tetrahydrate--Cadium Nitrate Tetrahydrate Melts...An Ideal Fused Salt System," C. T. Moynihan, C. R. Smalley, C. A. Angell and E. J. Sare, *J. Phys. Chem.*, 73 (6), 2287 (1969).
31. "Far Infrared Spectra of Inorganic Nitrate and Chloride Glasses, Liquids and Crystals: Complex Ions or Optical Phonons?" C. A. Angell, J. Wong, and W. F. Edgell, *J. Chem. Phys.*, 51, 4519 (1969).
32. "**Glass-Forming Composition Regions** and Glass Transition Temperatures for Aqueous Electrolyte Solutions," C. A. Angell and E. J. Sare, *J. Chem. Phys.*, 52, 1058 (1970).
33. "Mass Transport in Ionic Melts at Low Temperatures. Chronopotentiometric Diffusion Coefficients at Ag(I), Cd(II) and Tl(I) in Calcium Nitrate Tetrahydrate," C. T. Moynihan and C. A. Angell, *J. Phys. Chem.*, 74, 736 (1970).
34. "**Vitreous Water: Identification and Characterization**," C. A. Angell and E. J. Sare, *Science*, 168, 280 (1970).
35. "Electrical Conductance of Ionic Liquids with Water Contents in the Range 0-80 mol%", C. A. Angell, *Australian J. Chem.*, 23, 929. (1970).
36. "Structure and Glass Transition Thermodynamics of Liquid Zinc Chloride from Far Infrared, Raman, and Probe Ion Electronic and Vibrational Spectra," C. A. Angell and J. Wong, *J. Chem. Phys.*, 53, 2053 (1970).
37. "The Data Gap in Solution Chemistry, and the 'Ideal' Glass Transition Puzzle," C. A. Angell, *J. Chem. Ed.*, 47, 583 (1970).
38. "Application of Spectroscopy in the Study of Glassy Solids. I. X-ray Spectroscopy, X-ray Absorption Five Structure, U.V. Spectra and Visible Region Spectral Studies," J. Wong and C. A. Angell, *Rev. Appl. Spec.*, 4 (1), 97-154, (1970).
39. "Applications of Spectroscopy in the Study of Glassy Solids. II. Vibrational Spectra, EPR and NMR Spectra," J. Wong and C. A. Angell, *Rev. Appl. Spec.*, 4 (2), 155-232 (1970).
40. "Phase Equilibria, Electrical Conductance and Density in the Glass-Forming System ZnCl₂ + Pyridinium Chloride: A Detailed Low-Temperature Analogue of the SiO₂ + Na₂O System," *A. J. Eastel and C. A. Angell*, *J. Phys. Chem.*, 74, 3987 (1970).
41. "Glass Transitions in Molecular Liquids. I. Influence of Proton Transfer Processes in Hydrazine-Based Solutions," E. J. Sutter and C. A. Angell, *J. Phys. Chem.*, 75, 1826 (1971).
42. "Corresponding States and the Glass Transition for Alkali Metal Nitrates," C. A. Angell and D. B. Helphrey, *J. Phys. Chem.*, 75, 2306 (1971).
43. "Thermodynamic and Relaxational Aspects of the Glass Transition from a 'Bond Lattice' Model," K. J. Rao and C. A. Angell, contribution to *Amorphous Solids*, Eds. R. W. Douglas and D. Ellis, Wiley and sons (1971) Proceedings Book Third International Conference (Sheffield 1970) on "Physics of Non-Crystalline Solids."
44. "Conductivity and **Dielectric Relaxation in Concentrated** Aqueous Lithium Chloride Solutions," C. T. Moynihan, R. D. Bressel and C. A. Angell, *J. Chem. Phys.*, 55, 4414 (1971).
45. "Two-State Thermodynamics and Transport Properties for Water from **Bond Lattice Model**," C. A. Angell, *J. Phys. Chem.*, 75, 3698 (1971).
46. "**Fused Salts**," C. A. Angell, invited review for *Ann. Rev. Phys. Chem.*, 22, 429 (1971).
47. "Spectroscopic Detection of the Glass Transition: the n₁□□* Transition in Nitrate Melts," J. Wong and C. A. Angell, *J. Non-Cryst. Solids*, 7, 109 (1972).
48. "Viscosity of Molten ZnCl₂ and Supercritical Behavior in its Binary Solutions," A. J. Eastel and C. A. Angell, *J. Chem. Phys.*, 56, 4231 (1972).
49. "**Protonic** Semiconducting Glasses from Aqueous Solutions," C. A. Angell, R. D. Bressel and P. M. Gammel, *J. Non-Cryst. Solids*, 7, 295 (1972).
50. "Configurational Excitations in Condensed Matter and the Bond Lattice Model for the Liquid-Glass Transition," **C. A. Angell and K. J. Rao**, *J. Chem. Phys.*, 57, 470-481 (1972).

51. "Electrical Conductance in Supercritical Isobutyric Acid-Water Solutions," P. M. Gammel and C. A. Angell, *Physics Letters A*, 40A, 49 (1972).
52. "Self-Diffusion of Ag^+ and Na^+ in Molten $\text{Ca}(\text{NO}_3)_2$ - KNO_3 ," B. J. Welch and C. A. Angell, *Aust. J. Chem.*, 25, 1613 (1972).
53. "Fluidity and Conductance in Aqueous Electrolyte Solutions: An Approach from the Glassy State and the High Concentration Limit. I. $\text{Ca}(\text{NO}_3)_2$ Solutions," C. A. Angell and R. D. Bressel, *J. Phys. Chem.*, 76, 3244 (1972).
54. "Transport in Ionic Liquids Under Pressure. II. Concentrated Calcium Nitrate - Water and Magnesium Chloride - Water Solution," C. A. Angell, L. J. Pollard and W. Strauss, *J. Sol. Chem.*, 1, 516 (1972).
55. "Spectroscopic Probing of Anion Environment in Inorganic Nitrate Glasses," J. Wong and C. A. Angell, *J. Non-Cryst. Solids*, 11, 402 (1973).
56. "Pressure Effects on the Far Infrared Spectra of Nitrate Glasses," J. Wong and C. A. Angell, *Chemical Physics Letters*, 18, 221 (1973).
57. "Glass-Forming Composition Regions and Glass Transition Temperature in Non-Aqueous Electrolyte Solutions," E. J. Sare and C. A. Angell, *J. Sol. Chem.*, 2, 53 (1973).
58. "Diamond Cell Study of Pressure-Induced Coordination Changes for Ni(II) in Liquid Chloride Solvents," C. A. Angell and M. L. Abkemeier, *Inorg. Chem.*, 12, 1462 (1973).
59. "Thermodynamic Properties of M(I) - M(II) Mixed Nitrate Glasses and Supercooled Liquids," K. J. Rao, C. A. Angell and D. B. Hephrey., *Phys. Chem. Glasses*, 14, 26 (1973).
60. "Proton Magnetic Resonance Chemical Shifts and the Hydrogen Bond in Concentrated Aqueous Electrolyte Solutions," E. J. Sare, C. T. Moynihan and C. A. Angell, *J. Phys. Chem.*, 77, 1869 (1973).
61. "Anomalous Heat Capacities of Supercooled Water and D_2O ," D. H. Rasmussen, A. P. Mackenzie, J. C. Tucker and C. A. Angell, *Science*, 181, 4079 (1973).
62. "Glass Transition with Negative Change in Expansion Coefficient," E. Williams and C. A. Angell, *J. Polymer Science, Polymer Letters*, 11, 383 (1973).
63. "A Novel Electrolyte System: Solutions of Diethyl Ether in Concentrated Aqueous HCL + ZnCl_2 Mixtures," A. J. Easteal and C. A. Angell, *J. Electrochem. Soc.*, 120, 1143 (1973).
64. "Anomalous Properties of Supercooled Water: Heat Capacity, Expansivity, and PMR Chemical Shift from 0-38°C," C. A. Angell, J. Shuppert and J. C. Tucker, *J. Phys. Chem.*, 77, 3092 (1973).
65. "FIR Spectra of Liquid, Glass, and Crystalline States of ZnCl_2 : Order and Temperature Effects on Band Shape," C. A. Angell, G. H. Wegdam and J. van der Elsken, *Spectrochim. Acta*, 30A, 665 (1974).
66. "Electrical Conductivity and Viscosity of Supercritical Isobutyric Acid-Water Solutions," P. M. Gammel and C. A. Angell, *J. Chem. Phys.*, 60, 584 (1974).
67. "Glass Forming Molten Salt Systems," C. A. Angell and J. C. Tucker, in *Chemistry of Process Metallurgy*, Richardson Conference (Imperial College of Science, London, 1973), Eds. J. H. E. Jeffes And R. J. Tait, Inst. Mining Metallurgy Publ., 1974, p. 207.
68. "Glass Transition Temperature, Electrical Conductance, Viscosity, Molar Volume, Refractive Index, and Proton Magnetic Resonance Study of Chlorozinc Complexation in the System $\text{ZnCl}_2 + \text{LiCl} + \text{H}_2\text{O}$," A. J. Easteal, E. J. Sare, C. T. Moyni-han and C. A. Angell, *J. Sol. Chem.*, 3, 807 (1974).
69. "Heat Capacities and Fusion Entropies of the Tetrahydrates of Calcium Nitrate, Cadmium Nitrate, and Magnesium Acetate. Concordance of Calorimetric and Relaxational 'Ideal' Glass Transition Temperatures," C. A. Angell and J. C. Tucker, *J. Phys. Chem.*, 78, 278 (1974).
70. "Supercooling of Water to -92°C Under Pressure," H. Kanno, R. J. Speedy and C. A. Angell, *Science*, 189, 880 (1975).
71. "On the Use of Structural Probe Ions for Relaxation Studies in Glasses. I. Spectroscopic Properties of Cobalt (II) in Chloride-Doped Potassium Nitrate-Calcium Nitrate Glasses," A. Barkatt and C. A. Angell, *J. Phys. Chem.*, 79, 2192 (1975).
72. "Evidence for a Protonic Mechanism for the Anomalous Conductivity in Aqueous Acid Glasses," I. M. Hodge and C. A. Angell, *J. Non-Cryst. Solids*, 20, 299 (1976).
73. "Isothermal Compressibility of Supercooled Water and Evidence for a Thermodynamic Singularity at -45°C," R. J. Speedy and C. A. Angell, *J. Chem. Phys.*, 65, 851-858 (1976).
74. "Molecular Dynamics Studies of the Vitreous State: Simple Ionic Systems and Silica," L. V. Woodcock, C. A. Angell and P. A. Cheeseman, *J. Chem. Phys.*, 65, 1565 (1976).
75. "Density Maxima in High Pressure Supercooled Water, and a Relationship Between Water and Liquid SiO_2 ," C. A. Angell and H. Kanno, *Science*, 193, 1121 (1976).
76. "Thermodynamics of the Glass Transition: Empirical Aspects," C. A. Angell and W. Sichina, *Ann. N.Y. Acad. Sci.*, Vol. 279, (Proc. Workshop on the Glass Transition and the Nature of the Glassy State) (1976), p. 53.
77. "Physico-Chemical and Computer Simulation Studies of the Role of Cation Coordination Numbers on Melt Physical Properties," C. A. Angell, I. M. Hodge, and P. A. Cheeseman, in *Molten Salts*, Proc. Int. Conf. Molten Salts, Ed. J.P. Pemsler, The Electrochemical Soc. Inc., (1976), p. 138.
78. "Kinetics of Structural Relaxation in the Glass Transformation Range of a Calcium-Potassium Nitrate Melt by Probe Ion Spectroscopy," C. A. Angell, A. Barkett, C. T. Moynihan, and H. Sasabe, in *Molten Salts*, Proc. Int. Conf.

- Molten Salts, Ed. J.P. Pemsler, The Electrochemical Soc. Inc., (1976), p. 195.
79. *Glass: Structure by Spectroscopy*, by J. Wong and C. A. Angell, Marcel Dekker, New York, New York (1976).
 80. "Spin-Echo Diffusion Coefficients of Water to 2380 bar and -20°C," C. A. Angell, E. D. Finch, L. A. Woolf and P. Bach. *J. Chem. Phys.*, 65, 3063 (1976).
 81. "Pressure Dependence of the Glass Transition Temperature in Ionic Liquids and Solutions: Evidence Against Free Volume Theories," E. Williams and C. A. Angell, *J. Phys. Chem.*, 81, 232 (1977).
 82. "Heat Capacity and Glass Transition Thermodynamics for ZnCl₂. A Failure of the First Davies-Jones Relation for dT/dP," C. A. Angell, E. Williams, K. J. Rao and J. C. Tucker, *J. Phys. Chem.*, 81, 238 (1977).
 83. "The Charge Transfer to Solvent Spectrum of Iodide in Supercooled Water and Glassforming Aqueous Solutions," A. Barkatt and C. A. Angell, *J. Phys. Chem.*, 81, 114 (1977).
 84. "Molecular Dynamics Modelling of Amorphous Solid Structures," C. A. Angell, P. A. Cheeseman, L. V. Woodcock and J. H. R. Clarke, in *The Structure of Non-Crystalline Materials*, Ed. P. Gaskell, Taylor Publishing Co., Cambridge, (1977) pp. 191-194.
 85. "Electrical Relaxation in Amorphous Protonic Conductors," I. M. Hodge and C. A. Angell, *J. Chem. Phys.*, 67, 4 (1977).
 86. "Mechanical Collapse vs. Ideal Glass Formation in Slowly Vitrified Solutions: A Plausibility Test," C. A. Angell and J. Donnelly, *J. Chem. Phys.*, 67, 4560 (1977).
 87. "NMR Study of Proton Transfer Interactions in the System Pyridine + HCl (0-95%)," J. W. Shuppert and C. A. Angell, *J. Chem. Phys.*, 67, 3050 (1977).
 88. "Electron Free Energy Levels and Spectroscopic Character of Dilute Species in Oxidic Solvents: Relating Aqueous to Liquid (and Vitreous) Oxide Solutions," C. A. Angell, in *Spectroscopic and Electrochemical Characterization of Solute Species in Non-Aqueous Solvents*, Ed. G. Mamantov, Plenum Press, (1977), p. 273.
 89. "Homogeneous Nucleation and Glass Formation in Aqueous Alkali Halide Solutions at High Pressures," H. Kanno and C. A. Angell, *J. Phys. Chem.*, 81, 2639 (1977).
 90. "The Relative Permittivity of Supercooled Water," I. M. Hodge and C. A. Angell, *J. Chem. Phys.*, 68, 1363 (1978).
 91. "Ionic Hydration and Secondary Relaxations in Vitrified Concentrated Aqueous Solutions," I. M. Hodge and C. A. Angell, *J. Phys. Chem.*, 82, 1761 (1978).
 92. "Ionic Salt and Solution Glasses," C. A. Angell, invited contribution to *A Treatise on Glass*, Vol. I, Eds. D.R. Uhlmann and N.J. Kreidl. Academic Press, Inc., 1983, pp. 209-226.
 93. "Glass Transition Temperatures for Simple Molecular Liquids and Their Binary Solutions," J. M. Sare, E. J. Sare and C. A. Angell, *J. Phys. Chem.*, 82, 2622 (1978).
 94. "Use of Structural Probe Ions for Relaxation Studies in Glasses. II. T-Jump and T-Ramp Studies of Co(II) in Nitrate Glasses," A. Barkatt and C. A. Angell, *J. Phys. Chem.*, 82, 1972 (1978).
 95. "Highly Conducting Li-Rich Inorganic Glasses," S. I. Smedley and C. A. Angell, *Sol. State Comm.*, 27, 1 (1978).
 96. "Radiation Products and Tunnelling Process in Ionic Glasses. Part I: Radiation Products and Recombination in Undoped Nitrate and Acetate Glasses," A. Barkatt, C. A. Angell and J. R. Miller, *J. Phys. Chem.*, 82, 2143 (1978).
 97. "Optical Probe Studies of Relaxation Processes in Viscous Liquids," A. Barkatt and C. A. Angell, *J. Chem. Phys.*, 70, 901 (1979).
 98. "Water: Anomalous Compressibility to 1.9 kbar and Correlation with Supercooling Limits," H. Kanno and C. A. Angell, *J. Chem. Phys.*, 70, 4008 (1979).
 99. "Non-Vibrational Non-Diffusional Modes of Motion in Hydrated Calcium Nitrate Melts," I. M. Hodge and C. A. Angell, Proc. Oxford Conference on Concentrated Solutions and Molten Salts, Plenum Press (1979). (Invited).
 100. "Ionic Conductivity in Lithium Oxide-Fluoride Glasses," L. Boehm and C. A. Angell, Proc. of Fast Ion Transport in Solids Conference. Lake Geneva, Wisconsin, Eds. P. Vashishta, J.N. Mundy and G.K. Shenoy, Elsevier North Holland, Inc., (1979) p. 719.
 101. "Pressure Dependence of the Glass Transition Temperature in Molecular Liquids and Plastic Crystals," T. Atake and C. A. Angell, *J. Phys. Chem.*, 83, 3218 (1979).
 102. "Heat Capacity Changes in Glass-Forming Aqueous Solutions, and the Glass Transition in Vitreous Water," C. A. Angell and J. C. Tucker, *J. Phys. Chem.*, 84, 268 (1980).
 103. "D.C. Conductivity and Secondary Structural Relaxation in High Conducting Li⁺ Glasses," L. Boehm and C. A. Angell, *J. Non-Cryst. Solids*, 40, 83 (1980).
 104. "Supercooled and Superheated Water," C. A. Angell, in *Water and Steam*, Proceedings of the Ninth International Conference on the Properties of Steam, Munich. (1979), Eds. F. Straub and K. Scheffler, Pergamon Press, Ltd. (1980) p. 233 (invited article).
 105. "Proton NMR Studies of the Lewis Acid-Base Reactions Between Pyridinium Chlorides and the Acids ZnCl₂ and AlCl₃," C. A. Angell and J. W. Shuppert, *J. Phys. Chem.*, 84, 538 (1980).
 106. "Vibrational Bandshapes in Viscous Liquids and Glasses," C. A. Angell, text of an invited contribution to the NATO Advanced Summer Institute published as *Vibrational Spectroscopy in Molecular Liquids and Solids*, Eds. E.M. Pick and S. Bratos, Plenum Press, (1980) p. 187.

107. "Fast Li⁺ Conduction in Fluoroborate Glasses," S. I. Smedley and C. A. Angell, *Mat. Res. Bulletin*, 15 (4), 421 (1980).
108. "Application of the Rheovibron to Inorganic Glass Problem I. The Mixed Alkali Effect Loss Spectrum," T. Atake and C. A. Angell, Proc. of the Int. Congress on Glass XII, Albuquerque, New Mexico, *J. Non-Cryst. Solids*, 38 & 39, 439-444 (1980).
109. "Glass Formation in Aqueous Sodium Salt Solutions," C. A. Angell and E. J. Sare, *CryoLetters*, 1, 257 (1980).
110. "Volumetric and Derived Thermal Characteristics of Liquid D₂O at Low Temperatures and High Pressures," H. Kanno and C. A. Angell, *J. Chem. Phys.*, 73, 1940 (1980).
111. "Heat Capacities of Liquid H₂O + H₂O₂, and H₂O + N₂H₄, Binary Solutions; Isolation of a Singular Component for C_p of Supercooled Water," M. Oguni and C. A. Angell, *J. Chem. Phys.*, 73, 1948 (1980).
112. "Supercooled Water," C. A. Angell, in *Water: A Comprehensive Treatise*, Vol. 7, Ed. F. Franks, Plenum Press, (1982) pp. 215-338, (invited article).
113. "Interaction Potentials and Glass Formation: A Survey of Computer Experiments," C. A. Angell, J. H. R. Clarke and L. V. Woodcock, *Adv. Chem. Phys.*, 48, 397-453 (1981). (Result of NATO collaboration) (invited article).
114. "d.c. Conductivities, Electrical Relaxation Spectra, and Conduction Mechanisms in Lithium Oxide-Fluoride Glasses of the System LiF-Li₂O-B₂O₃ and LiF-Li₂O-Al(PO₃)₃," S. I. Smedley and C. A. Angell, *J. Am. Ceram. Soc.* (submitted).
115. "Visible Spectroscopy of Irradiated High Alkali Borate and Mixed Alkali Phosphate Glasses," A. Barkatt, C. A. Angell and J. R. Miller, *J. Amer. Ceram. Soc.*, 64, 158 (1981).
116. "Test of a Year-Annealed Glass for the Cohen-Grest Percolation Transition," L. Boehm, M. D. Ingram and C. A. Angell, *J. Non-Crystalline Solids*, 44, 305 (1981).
117. "Temperature Dependence of the Dynamic Structure Factor for Supercooled Sn_(1-x)Pb_x Alloys. A Test of Instability Theories for the L S Phase Transition," J.-B. Suck, J. H. Perepezko, I. E. Anderson and C. A. Angell, *Phys. Rev. Letters*, 47, 424 (1981).
118. "The Glass Transition: Comparison of Computer Simulation and Laboratory Studies," C. A. Angell, *Annals of the New York Academy of Science*, 371, 136 (1981).
119. "Inorganic Chloride and Mixed Halide Glasses with Low Maximum Phonon Frequencies," C. A. Angell and D. C. Ziegler, *Mat. Res. Bull.*, 3 (16), 279 (1981).
120. "Homogeneous Nucleation and Glass Transition Temperatures in Solutions of Li Salts in D₂O and H₂O," C. A. Angell, E. J. Sare, J. Donnella and D. R. MacFarlane, *J. Phys. Chem.*, 85, 1461 (1981).
121. "Non-Oxide Glasses," Article No. M145-00264, C. A. Angell, in *Encyclopedia of Materials Science and Engineering*, Ed. M.B. Bever, Pergamon Press (1986).
122. "Amorphous Solids: Types, Characteristics and Challenges," C. A. Angell, in *Preparation and Characterization of Materials*, ed. C. N. R. Rao and J. M. Honig, Academic Press (1981), p. 449 (invited paper).
123. "Far IR Spectra and Electrical Conductivity of Li and Na Glasses by Laboratory and Computer Simulation Experiments," C. A. Angell, L. Boehm, P. A. Cheeseman and S. Tamaddon, *Solid State Ionics*, 5, 659 (1981).
124. "Fast Ion Conduction in Cubic Perovskite Structures: An Ion Dynamics Study of NaMgF₃," P. A. Cheeseman and C. A. Angell, *Solid State Ionics*, 5, 597 (1981).
125. "Heat Capacity of Water at Extremes of Supercooling and Superheating," C. A. Angell, W. J. Sichina and M. Oguni, *J. Phys. Chem.*, 86, 998 (1982).
126. "Conductimetric and Calorimetric Methods for the Study of Homogeneous Nucleation and Crystallization Below Both T_h and T_c," C. A. Angell and D. R. MacFarlane, *Advances in Ceramics*, 4, 66 (1981).
127. "Diffusivity of the Hard-Sphere Model in the Region of Fluid Metastability," L. V. Woodcock and C. A. Angell, *Phys. Rev. Letters*, 47, 1129 (1981).
128. "Homogeneous Nucleation and Glass Formation in Cryoprotective Systems at High Pressure," D. R. MacFarlane, C. A. Angell and G. M. Fahy, *Cryoletters*, 2, 353-358 (1981).
129. "Viscosity-Temperature Function for Sorbitol from Combined Viscosity and Differential Scanning Calorimetry Studies," C. A. Angell, R. Stell and W. J. Sichina, *J. Phys. Chem.*, 86, 1540 (1982).
130. "Controlled Nucleation and Quasi-Ordered Growth of Ice Crystals from Low Temperature Electrolyte Solutions; A Small Angle Neutron Scattering Study," J. Dupuy, P. Chieux, R. Calemczuk, J. F. Jal, C. Ferradou, A. Wright and C. A. Angell, *Nature*, 296, 138-140 (1982).
131. "Optical vs. Thermodynamic Basicities: Probe Pb²⁺ Ion Spectra in Molten Chloroaluminate Solutions," C. A. Angell and P. D. Bennett, *Inorg. Chem.*, 104, 3604, (1982).
132. "Water - A Fascinating Molecular Substance" (Les anomalies de l'eau), C. A. Angell, *LaRecherche*, 5, 584-593 (1982) (invited article).
133. "Test of the Entropy Basis of the VTF Equation: Dielectric Relaxation of Polyalcohols Near T_g," C. A. Angell and D. L. Smith, *J. Phys. Chem.*, 86, 3845 (1982).
134. "An Inexpensive High Pressure Optical Absorption Cell for IR-VIS-UV Studies," V. E. Rodgers and C. A. Angell, *J. Chem. Ed.*, 60, 602 (1983).
135. "Water-like Transport Property Anomalies in Liquid Silicates Investigated at High T and P by Computer Simulation Techniques," C. A. Angell, P. A. Cheeseman and S. Tamaddon, *Bull. Mineralogie*, 1-2, 87-99 (1983).

136. "An Emulsion Technique for the Study of Marginal Glass Formation in Molecular Liquids," D. R. MacFarlane and C. A. Angell, *J. Phys. Chem.*, 86, 1927 (1982).
137. "High Refractive, Low ABBE Number, Halide Glasses," D. C. Ziegler and C. A. Angell, *Applied Optics*, 21, 2096 (1982).
138. "Tailoring Stimulated Emission Cross Sections of Nd³⁺ Laser Glass: Observation of Large Cross Sections for BiCl₃ Glasses," M. Weber, D. C. Ziegler and C. A. Angell, *J. Appl. Phys.*, 53 (6), 4344-4350 (1982).
139. "Pressure Enhancement of Ion Mobilities in Liquid Silicates from Computer Simulation Studies to 800kbar," C. A. Angell, P. A. Cheeseman and S. Tamaddon, *Science*, 218, 885 (1982).
140. "Anomalous Components of Supercooled Water Expansivity. Compressibility and Heat Capacity (C_p vs. C_v) from Binary Formamide + Water Solution Studies," M. Oguni and C. A. Angell, *J. Chem. Phys.*, 78 (12), 7334 (1983).
141. "Short Time Structural Relaxation Processes: Comparison of Experimental and Computer Simulation Glass Transitions on Equivalent Time Scales," L. M. Torell and C. A. Angell, *J. Chem. Phys.*, 78, 937 (1983).
142. "Near Infra-Red Spectra and the Disrupted Network Model of Normal and Supercooled Water," C. A. Angell and V. Rodgers, *J. Chem. Phys.*, 80, 6245 (1984).
143. "Cooling Rate Dependence of the Ice I Nucleation Temperature in Aqueous LiCl Solutions," D. R. MacFarlane, R. K. Kadiyala and C. A. Angell, *J. Phys. Chem.*, 87, 235 (1983).
144. "Computer Simulation Studies of Migration Mechanisms in Ionic Glasses and Liquids," C. A. Angell, P. A. Cheeseman and S. Tamaddon, *J. de Physique Colloque*, 43, C9-381 (1982).
145. "Tetrahedrally Coordinated Ionic Liquids," Anomalous Transport Properties, and Geophysical Significance," C. A. Angell, P. A. Cheeseman and S. Tamaddon in *Lecture Notes in Physics*, Eds. K.-H. Bennemann, F. Brouers and D. Quitmann, Springer-Verlag (1982), p. 131.
146. "Hydrophobic and Hydrophilic Solute Effects on the Homogeneous Nucleation Temperature of Ice from Aqueous Solutions," M. Oguni and C. A. Angell, *J. Phys. Chem.*, 87, 1848 (1983).
147. "Direct Observation of Time-Temperature-Transformation Curves for Crystallization of Ice from Solutions by a Homogeneous Mechanism," D. R. MacFarlane, R. K. Kadiyala, and C. A. Angell, *J. Phys. Chem.*, 87, 1094 (1983).
148. "On the Problem of Homogeneous Nucleation in Fluoride Glasses," M. Matecki, M. Poulain, J. Lucas, D. R. MacFarlane, and C. A. Angell, *Mat. Res. Bull.*, 18, 293 (1983).
149. "Supercooled Water," C. A. Angell, *Ann. Rev. Phys. Chem.*, 34, 593-630 (1983) (invited article).
150. "Homogeneous Nucleation and Growth of Ice from Solutions: TTT Curves, the Nucleation Rate and the Stable Glass Criterion", D. R. MacFarlane, K. Kadiyala and C. A. Angell, *J. Chem. Phys.*, 79 (8), 3921 (1983).
151. "Contrasting Effect of Tetrahedral and Octahedral Complexing of Trivalent Cations on Binary Molten Salt Solution Transport Properties," C. A. Angell and A. Elias, *J. Phys. Chem.*, 87, 4704-4709 (1983).
152. "Far-IR Transmitting Cadmium Iodide Based Glasses," E. I. Cooper and C. A. Angell, *J. Non-Cryst. Sol.*, 56, 75 (1983).
153. "Fast Ion Motion in Glassy and Amorphous Materials," C. A. Angell, *Solid State Ionics*, 9 & 10, 3 (1983)
154. "Versatile Organic Iodide Melts and Glasses with High Mole Fractions of LiI: Glass Transition Temperatures and Electrical Conductivities," E. I. Cooper and C. A. Angell, *Solid State Ionics*, 9 & 10, 617 (1983).
155. "CO₂-Retention in High Alkali Borate Glasses," S. W. Martin, E. I. Cooper and C. A. Angell, *Communications of the J. Amer. Ceram. Soc.*, 66 (9), C-153 (1983).
156. "Separation of Nucleation from Crystallization Kinetics by Two Step Calorimetry Experiments," R. K. Kadiyala and C. A. Angell, *Colloids and Surfaces*, 11, 341 (1984) (invited conference paper).
157. "Non-existent Glass Transition for Amorphous Solid Water," D. R. MacFarlane and C. A. Angell, *J. Phys. Chem.*, 88, 759 (1984).
158. "Electronic Spectra and Coordination of Ni²⁺ in Potassium Borate Glass and Melt to 1,000°C," T. C. Lin and C. A. Angell, *Comm. Am. Ceram. Soc.*, 67, C33 (1984).
159. "Glass Formation and Transition Temperatures in Sodium and Lithium Aluminoborate Melts up to 72 Mol% Alkali," S. W. Martin and C. A. Angell, *J. Non-Cryst. Sol.*, 66, 429 (1984).
160. "Fast Cu⁺ Ion Conducting Phosphate Iodide-Glasses," C. Liu and C. A. Angell, *Solid State Ionics*, 13, 105 (1984).
161. "Conductivity Maximum in Aluminoborate Glasses," S. W. Martin and C. A. Angell, *Comm., J. Am. Ceram. Soc.*, 67, C148 (1984).
162. "Emulsion Techniques for the Study of Glass Formation II. Low Melting Point Salt Hydrates," D. R. MacFarlane, C. A. Angell, *J. Phys. Chem.*, 88, 4779 (1984).
163. "Short Time Relaxation Processes in Liquids from Viscosity and Light Scattering Studies in Molten KCl₂BiCl₃," L. M. Torell, D. C. Ziegler and C. A. Angell, *J. Chem. Phys.*, 81, 5053 (1984).
164. "Fluoride Bridging Modes in Fluorozirconate Glasses by X-ray and Computer Simulation Studies," J. Lucas, C. A. Angell and S. Tamaddon, *Materials Res. Bulletin*, 19, 945 (1984).

165. "Strong and Fragile Liquids," C. A. Angell in *Relaxations in Complex Systems*, ed. K. Ngai and G.B. Wright, National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161 (1985), pg. 1.
166. "Fast Ion Conductors in Viscous Liquids and Glasses," C. A. Angell, in *Relaxations in Complex Systems*, ed. K. Ngai and G.B. Wright, National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161 (1985).
167. "Vitrification as an Approach to Cryopreservation," G. M. Fahy, D. R. MacFarlane, C. A. Angell and H. T. Meryman, *Cryobiology*, 21, 407-426 (1984).
168. "Glass Forming Microemulsions," C. A. Angell, R. K. Kadiyala and D. R. MacFarlane, *J. Phys. Chem.*, 88, 4593 (1984).
169. "Glass Forming Microemulsions: Vitrification of Simple Liquids, and Electron Microscope Probing of Droplet Packing Modes," J. Dubochet, M. Adrian, J. Teixeira, R. K. Kadiyala, C. M. Alba, D. R. MacFarlane and C. A. Angell, *J. Phys. Chem.*, 88 (Debye Memorial Issue), 6727 (1984) (Invited Contribution).
170. "Al³⁺ Coordination Changes in Liquid Silicates under Pressure," E. Ohtani, F. Taulelle and C. A. Angell, *Nature*, 314, 78 (1985).
171. "Glasses and Glassy Crystals from Molecular Ionic Systems," C. A. Angell, L. E. Busse, E. E. Cooper, R. K. Kadiyala, A. Dworkin, M. Ghelfenstein, H. Szwarc, and A. Vassal, *J. de Chim. Phys.*, 82, 267 (1985).
172. "Silver Alkali Halide Glasses and a Vitreous Analog of the RbAg₄I₅ Superionic Conductor," Changle Liu, H. G. K. Sundar and C. A. Angell, *Mat Res. Bull.*, 20, 525 (1985)
173. "Spectroscopy, Simulation, and the Medium Range Order Problem in Glass," C. A. Angell, *J. Non-Cryst. Solids, Kreidl Symposium*, (text of invited talk) 73, 1 (1985).
174. "d.c. and a.c. Conductivity in Wide Composition Range Li₂O-P₂O₅ Glasses," S. W. Martin and C. A. Angell, *J. Non-Cryst. Solids*, 83, 185, (1986).
175. "Optical and Thermodynamic Basicities: UV Spectra of Tl⁺, Pb²⁺ and Bi³⁺ in Molten Chloroaluminates Titrations," P. D. Bennett and C. A. Angell, *Inorg. Chem.*, 24, 3030 (1985).
176. "Strong and Fragile Plastic Crystals," C. A. Angell, A. Dworkin, P. Figuiere, A. Fuchs and H. Szwarc, *J. de Chimie Physique*, 82, 773 (1985).
177. "Mechanical versus Electrical Relaxation in AgI-based Fast Ion Conducting Glass," Changle Liu and C. A. Angell, *J. Non-Cryst. Sol.*, 83, 162 (1986).
178. "Spectroscopic Studies of Chemically Liberated "Free-OH" Groups in Aqueous N₂H₄-NH₃ and CH₃NH₂ Solutions", C. A. Angell and Dana L. Fields, *J. Phys. Chem.*, 89, 4565 (1985).
179. "Crystallization and Vitrification in Aqueous Systems," C. A. Angell and Y. Choi, *J. Microscop.*, 141, 251 (1986) (text of Plenary Lecture)
180. "Far IR Transmitting Halide Glasses," C. A. Angell, Changle Liu, and H. G. K. Sundar, *Materials Science Forum*, 5, 189 (1985) (Extended abstract).
181. "A Model for Fluorozirconate Glass Structure," J. Lucas and C. A. Angell, *Materials Science Forum*, 6, 449, (1985) (Extended abstract).
182. "Mechanical Relaxation by Mobile Ions Cu⁺ and Ag⁺ in Fast Ion Conducting Glasses," Changle Liu and C. A. Angell, *J. de Physique Colloque*, C10, Suppl. No. 12, 46, 493-496 (1985)
183. "Picosecond Mechanical Relaxation due to Fast Ion Diffusion and Structural Relaxation in AgI-Rich Glassforming Systems," L. Borgesson, S. W. Martin, L. M. Torell and C. A. Angell, in *Transport-Structure Relations in Fast Ion and Mixed Conductors*, eds F.W. Poulsen et al, Riso National Lab., Denmark 1985, p.383.
184. "Ambient Temperature Plastic Crystal Fast Ion Conductors (PLICFICS)" E. I. Cooper and C. A. Angell, *Solid State Ionics*, 18 & 19, 570 (1986).
185. "Glass Formation and High Conductivity in Lead Halide-Lead Metaphosphate Glasses," H. G. K. Sundar, S. W. Martin, and C. A. Angell, *Solid State Ionics*, 18 & 19, 437 (1986).
186. "All Halide Superionic Glasses," Changle Liu, H. G. K. Sundar and C. A. Angell, *Sol. State Ionics*, 18 & 19, 442 (1986).
187. "Recent Developments in Fast Ion Transport in Glassy and Amorphous Materials," C. A. Angell, *Solid State Ionics*, 18 & 19, 72 (1986) (text of plenary lecture).
188. "Sequential Hypersonic Dampings Due to Fast Ion Diffusion and Structural Relaxation in (AgI)_x(AgPO₃)_{1-x} Ionic Liquids," L. Borgesson, S. W. Martin, L. M. Torell and C. A. Angell, *Solid State Ionics*, 18 & 19, 141 (1986).
189. "Brillouin Scattering in AgI-Rich Glasses," L. Borgesson, S. W. Martin, L. Torell and C. A. Angell, *Sol. State. Ionics*, 18 & 19, 431, (1986).
190. "Long Time Relaxation Processes in Glassy Solids I. □-Relaxations in 'Fragile' Systems," H. G. K. Sundar and C. A. Angell, XIVth International Congress on Glass, Collected Papers, Indian Ceramic Society Pub. II, 161 (1986).
191. "Long Time Relaxation Processes in Glassy Solids II. □ Relaxations in Fast Ion Conducting Glasses." A. Kulkarni, H. Senapati, Changle Liu and C. A. Angell, XIVth International Congress on Glass, Collected Papers, Indian Ceramic Society Pub. II 169, (1986).
192. "Glass-Forming Microemulsions and Their Structure," D. R. MacFarlane, I. R. McKinnon, E. A. Hildebrand and C. A. Angell in *Microemulsion Systems*, ed. H. Rosano, Marcel Dekker, Inc. N.Y., 311 (1987).

193. "Dynamics of Compressed and Stretched Liquid SiO₂, and the Glass Transition," C. A. Angell, P. A. Cheeseman and C. C. Phifer, *Mat. Res. Soc. Symp. Proc.*, 63, 85-94, (1986).
194. "Glassy Solids and dc Conductivity in the Liquid and Glassy States," C. A. Angell, in *Materials for Solid State Batteries*, ed. B. V. R. Chowdari and S. Radhakrishna, (World Scientific: Singapore) p. 31-40, (1986).
195. "High Conductivity and Mechanical Loss in PbF₂-MnF₂-Al(PO₃)₃ Glasses," A. R. Kulkarni and C. A. Angell, *Mat. Res. Bull.*, 21, 1115, (1986).
196. "On the Glass Transition and Viscosity of P₂O₅," S. W. Martin and C. A. Angell, *J. Phys. Chem.*, 90 (25), 6736 (1986).
197. "Diffusivity and Thermodynamic Properties of **Diopside and Jadeite Melts** by Computer Simulation Studies," C. A. Angell, P. A. Cheeseman and R. R. Kadiyala, *Chemical Geology*, 62, 85-95 (1987).
198. "Relaxation Processes in Glassy Solids," C. A. Angell, H. G. K. Sundar, A. R. Kulkarni, H. Senapati and S. W. Martin, in *Molecular Dynamics and Relaxation Phenomena in Glasses*, Ed. Th. Dorfmüller and G. Williams, Lecture Notes in Physics, Springer - Verlag, 277, 75-89, (1987).
199. "The **Kauzmann Paradox**, Metastable Liquids, and Ideal Glasses: A Summary," C. A. Angell, D. R. MacFarlane, and M. Oguni., *Ann. N.Y. Acad. Sci.*, 484, 241 (1986).
200. *Dynamics of Structural Change in Liquids and Glasses*, Ann. N.Y. Acad. Sci. Vol 484, Eds. C. A. Angell and M. Goldstein, N.Y. Acad. Sci., N.Y., N.Y., 1986.
201. "A Structural Model for Prototypical Fluorozirconate Glass," Jacques Lucas, C. Laval, Carol C. Phifer, and C. Austen Angell, *J. Non-Cryst. Sol.*, 94, 315 (1987).
202. "Transport and Relaxation Processes in Molten Salts" in *Molten Salt Chemistry*, ed. G. Mamantov, and R. Marassi, NATO ASI series, Plenum Press, 202, 123 (1987).
203. "Far Infrared and Dielectric Relaxation Spectra in Supercooled Water and Water + Propylene Glycol Solutions," L. Boehm, D. L. Smith and C. A. Angell, *J. Mol. Liquids*, (invited for R. H. Cole Honor Issue), 36, 153 (1987).
204. "High Fluoride Ion Conduction and Conductivity Maxima with the Glassy System PbF₂-MnF₂-Pb(PO₃)₂," A. R. Kulkarni, H. G. K. Sundar, and C. A. Angell, *Solid State Ionics*, 24, 253, (1987).
205. "Crystallization Kinetics in InF₃-Based Glasses by Single and Multistep Calorimetry Techniques," H. Senapati, and C. A. Angell, *Mat. Science Forum*, 19-20, 443 (1987).
206. "High Ionic Conductivity in PEO • PPG Block Polymer + Salt Solutions," Ronjian Xue and C. A. Angell, *Solid State Ionics*, 25, 223 (1987).
207. "Ionic Conductivity in Wide-Range Halide-Pyrophosphate Glasses," H. G. K. Sundar, Changle Liu, and C. A. Angell, *Mat. Res. Bull.*, 22, 1533 (1987).
208. "Mechanical and Electrical Relaxation Due to Mobile Ions in a Superionic Glass Over the Range 1Hz - 20 GHz," L. Borjesson, L. M. Torell, S. W. Martin, Changle Liu, and C. A. Angell, *Physics Letters*, 125, 330 (1987).
209. "Complexation and Transport Properties in Binary Glass-Forming Molten Chloride Systems," A. Elias and C. A. Angell, *J. Chem. Eng. Data*, 32, 1 (1988).
210. "Mobile Ion Crossover Effects in the System LiF-PbF₂-Al(PO₃)₃ From Electrical, Mechanical, and T_g Studies," A. R. Kulkarni and C. A. Angell, *J. Non-Cryst. Sol.*, 99, 195 (1988).
211. "Supercooled Water: Approaching the Limits," C. A. Angell, invited for News and Views Section of *Nature*, 331, 206 (1987).
212. "Ion Dynamics Studies of Liquid and Glassy Silicates, and Gas-in-Liquid-Silicate Solutions," C. A. Angell, Carol Scamehorn, Carol C. Phifer, R. R. Kadiyala and P. A. Cheeseman, *Phys. Chem. Minerals*, 15, 221 (1988).
213. "Crystallization and Vitrification in Cryoprotected Aqueous Systems," C. A. Angell and H. Senapati, in *The Biophysics of Cryopreservation*, Eds. D. E. Pegg, and A. M. Karow, Plenum Press, p. 147-171 (1987) (text of invited lecture).
214. "**Ion-Matrix Coupling** in Polymer Electrolytes from Relaxation Time Studies," L. M. Torell and C. A. Angell, *Polymer J. (Proc. 1st International Conference on Polymer Electrolytes)*, *British Polymer Journal*, 20, 173 (1988).
215. "**New Modes** of Glass Formation Using Negative Pressure Quenching and Superstructuring Principles," C. A. Angell, J. Green, D. List, Z. Qing, H. Senapati, and J. C. Tucker, (Proc. Nashville Conference on "Effect of Modes of Formation on Glass Structure and Properties", Ed. W. Kinser and R. A. Weeks, Diffusion & Defect Data, 53-54, 77 (1987).
216. "Liquid Water in Metastable States," a contribution to the first "Advances" Supplement to the *Encyclopedia of Materials Science and Engineering*, Ed. R. W. Cahn, Pergamon, p. 577, (1988).
217. "**Contrasting Conductance/Viscosity** Relations in Glassy and Polymer 'Solid' Electrolytes", M. McLin and C. A. Angell, *J. Phys. Chem. (Letters Section)*, 92, 2083 (1988).
218. "**Structural Instability** and Relaxation in Glassy Phases," C. A. Angell, *J. Non-Cryst. Sol.*, 102, 205 (1988) (text of invited lecture).
219. "**Perspective** on the Glass Transition," C. A. Angell, invited contribution to the "Perspectives" section of *J. Phys. Chem. Sol.*, 49 (8), 863 (1988).
220. "Generation of Fractal Silicas by Negative Pressure Stretching of SiO₂ Glass," J. Kieffer and C. A. Angell, (Proc. Conf. Indust. Applications of Computer Simulation, Ed. N. Quirke, U.F.). *Molecular Simulations*, 3, 137 (1989).
221. "Influence of Cation Coordination Numbers on Transport Properties of Ionic Liquid Mixtures," A. Elias and C. A. Angell, *J. Phys. Chem. (Letters Sec.)*, 92, 5858 (1988).

222. "Structural Motifs in Fluoride Glasses and Their Influence on Liquid and Glassy State Properties," C. A. Angell and C. C. Phifer, *Mat. Sci. Forum*, 32-33, 373, (1988).
223. "Structural Characterization of Glass-Forming O/W Microemulsions by Neutron Scattering," C. Alba-Simionesca J. Teixeira, and C. A. Angell, *J. Chem. Phys.*, 91, 395, (1989).
224. "Correlation of Mechanical and Electrical Relaxation Phenomena in Superionic Glasses," C. A. Angell, *Mat. Chem. Phys.*, 23, 143, (1989)
- (b) "High-Pressure Synthesis of Nitride Glasses," T. Grande, S. Jacob, J. R. Holloway, P. F. McMillan, and C. A. Angell, *J. Non-Cryst. Sol.*, 184, 151 (1995).
225. "Phenomenology of Fast Ion Conducting Glasses: Facts and Confusions," C. A. Angell in *Solid Electrolytes*, Ed. T. Takahashi, World Scientific Press, Singapore, 1989, p. 89.
226. "The Glass Transition: An Assessment of Current Thinking," C. A. Angell, Nuclear Physics B. Proceedings Supplement, 5A, 69 (1988). (Text of presentation to University of California Statistical Mechanics Conference, March 1988).
227. "Generation of Fractal Structures by Negative Pressure Rupturing of SiO₂ Glass," J. Kieffer and C. A. Angell, *J. Non-Cryst. Solids*, 106, 336 (1988).
228. Structural Incompatibilities and Phase Separation in Molten Binary Silicates -- a Molecular Dynamics Study," J. Kieffer and C. A. Angell, *J. Chem. Phys.*, 90, 4982, (1989).
229. "Glass Formation and Conductivity in the Ag₂S-AgPO₃ System: Evidence Against Cluster Pathway Mechanisms for High Ionic Conductivity," L. Jun, J. Portier, B. Tanguy, J. J. Videau and C. A. Angell, *Solid State Ionics*, 345, 87, (1989).
230. "Phase Relations and Vitrification in Saccharide-Water Solutions and the Trehalose Anomaly," J. L. Green and C. A. Angell, *J. Phys. Chem.*, 93, 2880, (1989).
231. "Glassforming Liquid Oxides at the Fragile Limit of the Viscosity-Temperature Relationship," C. A. Angell, C. A. Scamehorn, D. L. List and J. Kieffer (Contribution to Proceedings of the XVth International Congress on Glass - Leningrad, 1989) ed. O.V. Mazurin, Leningrad, NAVKA, 1989, p.204.
232. "Glass in a Stretched State by Negative-Pressure Vitrification: Trapping In and Relaxing Out," C. A. Angell and Zheng Qing, *Phys. Rev. B*, Rapid Comm., 39, 8784,(1989).
233. "Effect of Pressure on Conductivity in Liquid and Glassy States of a Superionic Conducting Glass," C. A. Angell and J. Zhou, *Solid State Ionics*, 34, 243 (1989).
234. "Transition Range Viscosity of Rapidly Quenched Bi-Ca-Sr-Cu-O Glasses", M. Tatsumisago, C. A. Angell, S. Tsuboi, Y. Akamatsu, N. Tohge, and T. Minami, *Applied Phys. Lett.*, 54, 2268 (1989).
235. Crystallization Kinetics for Quenched Bi-Ca-Sr-Cu-O Glasses." M. Tatsumisago, C. A. Angell, Y. Akamatsu, S. Tsuboi, N. Tohge, and T. Minami, *Appl. Phys. Letters*, 55, 600 (1989).
236. "The Relation Between Debye and Non-Exponential Relaxation in Glassforming Alcohols," M. A. Floriano and C. A. Angell, *J. Chem. Phys.*, 91, 2537 (1989).
237. "Non-Random Mixing and Fast Ion Decoupling Lithium in Lithium Chloroborate Superionic Glasses: An Ion Dynamics Computer Simulation Study," R. Syed, J. Kieffer and C. A. Angell, *Symp. Mat. Res. Soc.*, 135, 73 (1989).
238. "AC and DC Studies of Non-Exponential Relaxation Processes in Superionic Conductors: Correlation of Conductivity and NMR Studies," C. A. Angell and S. W. Martin, *Symp. Mat. Res. Soc.*, 135, 63 (1989)
239. "Fast Ion Conduction in Glass; the New Solid Electrolytes," C. A. Angell, Proc. Workshop on Application of Glasses, Bangalore, India, Nov. 1988, eds K. J. Rao, A. R. Cooper, and H. Jain, World Scientific Pub., Singapore, 1989, p. 245.
240. "Thermodynamic Aspects of the Vitrification of Toluene, and Xylene Isomers, and the Fragility of Liquid Hydrocarbons," C. Alba, L. E. Busse, D. J. List and C. A. Angell, *J. Chem. Phys.*, 92, 617-624 (1990).
241. "Transformation Range Viscosity for Various Kinds of Glassy Liquids," M. Tatsumisago and C. A. Angell, *Proceedings of 30th Glass Meeting*, Japan, Sept. 28, 1989.
242. Transition Range Viscosity of Quenched Bi-Ca-Sr-Cu-O Glasses with Several Additives," M. Tatsumisago, C. A. Angell, N. Tohge, and T. Minami, *Chemistry Express*, 5, 9 (1990).
243. "Structure and Properties of New Glasses in the System TII-AgNO₃", L. Jun, B. Tanguy, J. J. Videau, J. Portier and C. A. Angell, *Mat. Sci. Eng.*, 5, 413 (1990).
244. "The Surface Tension and Molar Surface Free Energy of Water to -27.2°C," M. A. Floriano and C. A. Angell, *J. Phys. Chem.*, 94, 4199, (1990).
245. "Transport Processes, Relaxation, and Glass Formation in Hydrogen-Bonded Liquids," C. A. Angell in *Hydrogen-Bonded Liquids*, ed. J. C. Dore and J. Teixeira, NATO-ASI Series, Plenum Press (1990).
246. "Mid and Far IR Absorption of Alkali Borate Glasses, and the Limit of Superionic Conductivity," Changle Liu and C. A. Angell, *J. Chem. Phys.*, 93, 7378 (1990).
247. "Dynamic Processes in Ionic Glasses." C. A. Angell, *Chem. Rev.*, 90, 523 (1990).
248. "Fragility of Ge-As-Se Glassforming Liquids in Relation to Rigidity Percolation and the Kauzmann Paradox," M. ¹, B. L Halfpap, J. L. Green, S. M. Lindsay, and C. A. Angell, *Phys. Rev. Lett.*, 64, 1549-1553, (1990).
249. "Metastable Liquids: Phenomenology in Stretched and Supercooled States," C. A. Angell and J. L. Green, in *Lectures on Thermodynamics and Statistical Mechanics* (Proc. XIXth Winter Stat. Mech. Meeting, Oaxtepec,

- Mexico, Jan 2-5th, 1990) eds M. Lopez de Haro and C. Varea, World Scientific, Singapore, 1990, p. 155.
250. "Water and Solutions in the High Tension Regime: Raman Spectroscopic Study to -80 MPa Negative Pressure," J. L. Green, D. J. Durben, G. H. Wolf and C. A. Angell, *Science*, 249, 649, (1990).
251. "Effects of Coordination Environment on the Zr-F Symmetric Stretching Frequency of Fluorozirconate Glasses, Crystals and Melts," Carol C. Phifer, David J. Gostola, John Kieffer and C. Austen Angell, *J. Chem. Phys.*, 94, 3440 (1991).
252. Liquids, Rotator Phases, and Glass Transitions in Relation to Cation Symmetry in C12 Tetra-alkylammonium Bromides," E. I. Cooper and C. A. Angell, *J. Phys. Chem.* (under revision).
253. "Liquids at Large Negative Pressures: Water at the Homogeneous Nucleation Limit," Q. Zheng, D. J. Durben, G. H. Wolf and C. A. Angell, *Science*, 254, 829 (1991).
254. "Thermodynamic Aspects of the Glass Transition in Liquids and Plastic Crystals," C. A. Angell, *Pure and Appl. Chem.* (Text of Plenary Lecture), 63, 1387 (1991).
255. "Glass Formation and Anomalous Annealing Effects in the Mixed-Anion System $\text{Ag}_2\text{SO}_4\text{-Ag}_2\text{WO}_4\text{-AgI}$," H. Senapati and C. A. Angell, *J. Non-Cryst. Sol.*, 130, 58 (1991).
256. "Mechanical Stress Relaxation in Inorganic Glasses Studied by a Step Strain Technique," R. Böhmer, H. Senapati and C. A. Angell, *J. Non-Cryst. Sol.*, 131-133, 182 (1991).
257. "Relaxation, Glass Formation, and Rupture in Normal and Water-Like Liquids at Low Temperatures and/or Negative Pressure," C. A. Angell, in *Correlations and Connectivity; Geometrical Aspects of Chemistry and Biology*, Eds. H. E. Stanley and M. Ostrowsky, NATO-ASI series, Kluwer Academic Pub., (1990), p.133.
258. "Viscosity-Temperature Relations and Structure in Fully Polymerized Aluminosilicate Melts by Ion Dynamics Simulations," C. A. Scamehorn and C. A. Angell, *Geochim. Cosmochim. Acta*, 55, 721 (1991).
259. "Relaxation in Liquids, Polymers and Plastic Crystals - Strong/Fragile Patterns and Problems", C. A. Angell, *J. Non-Cryst. Sol.* 131-133, 13, (1991)
260. "Relation of Conductivity to Structure and Structural Relaxation in Ion-Conducting Glasses," C. A. Angell and H. Senapati, in *Recent Advances in Fast Ion Conducting Materials and Devices*, Eds. B. V. R. Chowdari, Q. Liu and L. Chen (Proc. 2nd SEATO Conference on Fast Ion Conductors, Beijing, Nov. 1990), p 248.
261. "Strong and Fragile Behavior in Liquid Polymers", C. A. Angell, L. Monnerie, and L. M. Torell, *Symp. Mat. Res. Soc.*, Ed. J. M. O'Reilly, 215, 3-9 (1991).
262. "Single and Two-step Calorimetry Studies of Homogeneous Nucleation and Growth Processes in Supercooled Ionic Glass-Forming Liquids: The $\text{Ca}(\text{NO}_3)_2\text{-KNO}_3$ System," H. Senapati, K. K. Kadiyala, and C. A. Angell, *J. Phys. Chem.*, 95, 7050 (1991).
263. "Vibrational Spectra in Fluoride Crystals and Glasses (Ba/Zr/F and BeF_2) at Normal and High Pressures", B. Boulard, C. A. Angell, J. Kieffer, and C. C. Phifer, *J. Non-Cryst. Sol.*, 140, 350-358 (1992).
264. "Ion-Pairing Effects on Viscosity/Conductance Relations in Raman-Characterized Polymer Electrolytes: LiClO_4 and NaCF_3SO_3 in PPG(4000)", M. C. McLin and C. A. Angell, *J. Phys. Chem.*, 95, 9464 (1991).
265. "Glass Transitions in Microemulsions," J. Teixeira, C. Alba-Simionesco and C. A. Angell, *Progr. Colloid Polym Sci.*, 84, 117 (1991).
266. "Nucleation and Crystallization Kinetics in Fragile Glass-Forming Liquids," H. Senapati and C. A. Angell, *J. Amer. Ceram. Soc.*, 74, 2659 (1991).
267. "Covalent Bond Connectivity, Medium Range Order, and Physical Properties in TeX and TeXAs Glasses," Jacques Lucas, Hong Li Ma, X. H. Zhang, Hema Senapati, Roland Böhmer and C. A. Angell, *J. Sol. State Chem.*, 96, 181 (1992).
268. "Diffusion Length Scales at the Glass Transition from Optical Probe Spectroscopy" A. Arzimanoglou and C. A. Angell, *J. Chem. Phys.* (under revision).
269. "Correlations of the Non-exponentiality and State Dependence of Mechanical Relaxations with Bond Connectivity in Ge-As-Se Supercooled Liquids," Roland Böhmer and C.A. Angell, *Phys. Rev. B.*, 45, 10091-10094 (1992).
270. "Elastic and Viscoelastic Properties of Amorphous Selenium: Possible Identification of the Elusive Phase Transition," R. Böhmer and C. A. Angell, *Physical Review B*, 48(9), 5857-5864 (1993).
271. "Connectivity, Fragility, and Non-exponentiality of Mechanical Relaxations, in Covalently Bonded Glassformers," R. Böhmer and C. A. Angell, *Mater. Sci. Forum*, 1993, 119-121, 485-490.
272. "An ac Technique for Simultaneous Study of Local and Global Linear Responses Near the Glass Transition: the Case of Doped $\text{Ca}^{++}/\text{K}^+/\text{NO}_3^-$," R. Böhmer, E. Sanchez and C. A. Angell, *J. Phys. Chem.* (Letters Section), 96, 9089-9092 (1992).
273. "Slow Processes in Viscous Liquids: Stress and Structural Relaxation, Chemical Reaction Freezing, Crystal Nucleation and Microemulsion Arrest, in Relation to Liquid Fragility," C. A. Angell, C. Alba, A. Arzimanoglou, R. Böhmer, J. Fan, Q. Lu, E. Sanchez, H. Senapati and M. Tatsumisago, (Text of opening talk at First Tohwa University International Symp. on Slow Dynamics, Fukuoka, Japan, November 1991), *Am. Inst. Phys. Conference Proceedings* No. 256, 3-19 (1992).
274. "Frequency-Dependent Conductivity Relaxation Times, and the Conductivity/Viscosity Coupling Problem in Polymer-Electrolyte Solutions: LiClO_4 and NaCF_3SO_3 in PPO 4000," M. G. McLin and C. A. Angell, (text of keynote

- lecture at the 8th International Conference on Solid State Ionics, Lake Louise, October 1991). *Solid State Ionics*, 53-56, 1027-1036 (1992).
275. "Al and Si coordination in SiO₂-Al₂O₃ glasses and Liquids: a Study by NMR and IR Spectroscopy and MD Simulations," B. T. Poe, P. F. McMillan, C. A. Angell, and R. K. Sato, *Chem. Geol.*, 96, 333 (1992).
 276. "A New Problem in the Correlation of Nuclear Spin Relaxation and Ionic Conductivity in Superionic Glasses," M. relaxation, C. A. Angell and S. W. Martin, *J. Chem. Phys.*, 97, 6968 (1992).
 277. "Signature of Ergodicity in the Dynamic Response of Amorphous Systems," R. V. Chamberlin, R. Böhmer, E. Sanchez and C. A. Angell, *Phys. Rev. B.* 46, 5787 (1992).
 278. "Mobile Ions in Amorphous Solids," C. A. Angell, *Ann. Rev. Phys. Chem.*, 43, 693 (1992).
 279. "GLASS," C. A. Angell, in *1994 Yearbook of Science and Technology*, (Sybil Parker, Ed.) [McGraw-Hill, Inc., New York, 1994], pp. 193-195.
 280. "Rubbery Solid Electrolytes with Dominant Cationic Transport, and High Ambient Conductivity," C. A. Angell, Changle Liu and E. Sanchez, *Nature* 362, 137-139, March 11, 1993.
 281. "Far IR Spectra and Heat Capacities for Propylene Carbonate and Propylene Glycol, and the Connection to the Dielectric Response," C.A. Angell, L. Boehm and M. Oguni, and D.L. Smith, *J. Mol. Liquids* 56, 275-286 (1993).
 282. "Liquid Fragility and the Glass Transition in Water and Aqueous Solutions," C.A. Angell, R.D. Bressel, J.L. Green, H. Kanno, M. Oguni, and E.J. Sare (Text of invited lecture at ISOPOW V) *Int. J. Food Science*, 22, 115-142, (1994).
 283. "Non-exponential Relaxations in Strong and Fragile Glass-formers," R. Bohmer, K.L. Ngai, C.A. Angell, D.J. Plazek, *J. Chem. Phys.*, 99(5), 4201-4209 (1993).
 284. "A New Type of Cation-conducting Rubbery Solid Electrolyte: The Ionic Rubber," C.A. Angell, Changle Liu and E.Sanchez, *Symp. Mat. Res. Soc.*, 293, 75 (1993).
 285. "Conductivity vs. NMR Correlation Times, and Decoupled Cation Motion in Polymer-in-Salt Electrolytes," Jiang Fan, R.F. Marzke, and C.A. Angell, *Symp. Mat. Res. Soc.*, 293, 87 (1993).
 286. "Water II Is A Strong Liquid," C.A. Angell, *J. Phys. Chem.*, 97(24), 6339-6341, 1993.
 287. "Mechanical Spectroscopy of the Glassy State," C.A. Angell, chapter in Book *Mechanical Spectroscopy*, Ed. L. Magalas, Elsevier Publ., (1994) (in press).
 288. "The Protein-Glass Analogy: Some Insights from Homopeptide Comparisons," J. L. Green, J. Fan, and C. A. Angell, *J. Phys. Chem.* 98(51), 13780-13791 (1994).
 289. "Local and Global Relaxations in Glass-forming Materials," in *Disorder Effects on Relaxational Processes*, R. Böhmer, C. A. Angell, edited by A. Blumen and R. Richert (Springer, Berlin, 1994, p. 11).
 290. "Conductivity and Nuclear Spin Relaxation in Superionic Glasses, Polymer Electrolytes, and the New Polymer-In-Salt Electrolyte," J. Fan, R.F. Marzke, and E. Sanchez, and C.A. Angell, *J. Non-Cryst. Sols*, 172-174, 1178-1189 (1994) (text of invited talk at Second International Conference on Relaxation in Complex Systems).
 291. "Hydrogen Bonding and the Fragility of Supercooled Liquids and Biopolymers" C.A. Angell, C. Alba Simionescu, J. Fan, and J.L. Green, (text of opening talk at NATO Conference on Hydrogen Bonded Liquids, Cargese, Corsica, Sept., 1993). *NATO-ASI Series C* (Math, and Phys., Sci) Vol. 435, p. 3-22.
 292. "Novel Features in the Equation of State of Metastable Water," P.H. Poole, F. Sciortino, U. Essmann, M. Hemmati, H.E. Stanley, and C.A. Angell, Proceedings of NATO ARW *Hydrogen Bond Networks*, Cargese, France, August, 1993. NATO-ASI Series C (Math, and Phys., Sci) Vol. 435, P. 53-60.
 293. "Is there a Second Critical Point in Water?" H.E. Stanley, C.A. Angell, U. Essman, M. Hemmati, P.H. Poole and F. Sciortino, *Physica A* 205, 122 (1994).
 294. "Sub-ambient T_g Glasses for Ionic Rubbers and New Generation Solid Electrolytes," (text of plenary lecture), Changle Liu, E. Sanchez, and C.A. Angell, 1994, *Chimica Chronica*, New Series, 23, 211-220 (1994).
 295. (a) "Nitride Glasses Obtained by High Pressure Synthesis," T. Grande, J.R. Holloway, P.F. McMillan, and C.A. Angell, *Nature*, 369, 43-45 (1994)
(b) "High-Pressure Synthesis of Nitride Glasses," T. Grande, S. Jacob, J. R. Holloway, P. F. McMillan, and C. A. Angell, *J. Non-Cryst. Sol.*, 184, 151 (1995).
 296. "Diffusion in Amorphous Solids: Some General Features", J. Shao and C.A. Angell, chapter in Book *Diffusion in Amorphous Materials*, Ed. H. Jain & D. Gupta, The Minerals, Metals and Materials Society, 1-16 (1994).
 297. "Li-conducting Ionic Rubbers for Lithium Battery and Other Applications," C. Austen Angell, Jiang Fan, Changle Liu, Eduardo Sanchez, and Kang Xu, *Solid State Ionics*, 69, 343-353 (1994).
 298. "Glasses With Strong Calorimetric α -Glass Transitions, and the Relation to the Protein Glass Transition Problem," J. Fan, E.I. Cooper, and C.A. Angell, *J. Phys. Chem.*, 98, 9345 (1994).
 299. "Effect of Hydrogen Bonds on the Thermodynamic Behavior of Liquid Water", P.H. Poole, F. Sciortino, T. Grande, H.E. Stanley, and C.A. Angell, *Phys. Rev. Lett.*, 73, 1632-1635 (1994).
 300. "Formation of Glasses from Liquids and Biopolymers," C. A. Angell, *Science*, 267, 1924 (1995).
 301. "Glassforming Liquids, Anomalous Liquids, and Polyamorphism in Liquids and Biopolymers," C. A. Angell, P. H. Poole, and J. Shao, *Nuovo Cimento*, 16D, 993 (1994).

302. "The Old Problems of Glass and the Glass Transition, and the Many New Twists," C. A. Angell, *Proc. National Academy of Sciences*, 92, 6675-6682 (1995).
303. "Non-Crystallizing Molten Salt and Ionic Rubber Electrolytes with Wide Electrochemical Windows," K. Xu and C.A. Angell, *Symp. Mat. Res. Soc.*, 369, 505 (1995).
304. "Fast and Slow Relaxation Processes in Polymer Electrolytes," R. Bergman, A. Brodin, D. Engberg, Q. Lu, C. A. Angell and L. M. Torell, *Electrochim. Acta*, 40, 2049 (1995).
305. "Rubbery Behavior from Low Molecular Weight Polymers Using High Field Cation Endlinkers," Q. Lu, E. Sanchez, and C.A. Angell, *Electrochim. Acta*, 40, 2239 (1995).
306. "The Preparation, Conductivity, Viscosity, and Mechanical Properties of Polymer Electrolytes and New Hybrid Ionic Rubber Electrolytes," J. Fan and C.A. Angell, *Electrochim. Acta*, 40, 2397 (1995).
307. "Synthesis and Characterization of Lithium Sulfonates as Components of Molten Salt Electrolytes", Kang Xu and C. A. Angell, *Electrochim. Acta*, 40, 2401 (1995).
308. "Crystalline-Amorphous Transition in Silicate Perovskites," Hemmati, M., Chizmeshya, A., Wolf, G. H., Poole, P. H., Shao, J., and Angell, C. A., *Phys. Rev. B*, 51, 14,841 (1995).
309. "Viscosity of Salt-in-Polymer Solutions Near the Glass Transition by Penetrometry Studies," M. G. McLin, C. A. and Angell, *Polymer*, 37, 4713 (1996).
310. "Why $C_1 = 16-17$ in the WLF Equation is Physical – and the Fragility of Polymers," C. A. Angell, *Polymer* 38 (26), 6261 (1997).
311. "Vibrational anharmonicity and the glass transition in strong and fragile vitreous polymorphs," J. Shao and C.A. Angell, *Proc. XVIIth Internat. Congress on Glass*, Vol. 1, P. 311, Beijing (1995).
312. "Crystal Stability Limits at Positive and Negative Pressures and the Crystal-to-Amorphous Transition," F. Sciortino, U. Essman, H. E. Stanley, M. Hemmati, J. Shao, G. H. Wolf and C. A. Angell, *Phys. Rev. E*, 52, 6484 (1995).
313. "Probe Ion Diffusivity Measurements in Salt-in-Polymer Electrolytes; Stokes Radii, and the Transport Number Problem," McLin, M.G. and Angell, C.A., *J. Phys. Chem.* 100, 1181-1188 (1996) Honor issue for Harold Friedman.
314. "Simulation of Glasses and Glassforming Liquids After Two Decades: Some Perspectives," C. A. Angell *Computational Mat. Sci.*, 4, (1995) 285.
315. "Relaxational Transitions and Ergodicity Breaking Within the Fluid State: the Sugars Fructose and Galactose," J. Fan and C. A. Angell, *Thermochimica Acta* 280, 523 (1996).
316. "Glass Transitions and First Order Liquid-Metal-to-Semiconductor Transitions in 4-5-6 Covalent Systems," C. A. Angell, S. Borick and M. Grabow, Proc. 17th Conference on Liquid and Amorphous Metals and Semiconductors, *J. Non-Cryst. Solids*, 205-207, 463-471 (1996).
317. "Vitrification of Trehalose by Water Loss from its Crystalline Dihydrate," S.-P. Ding, J. Fan, J. L. Green, Q. Lu, E. Sanchez and C. A. Angell, *J. Thermal Analysis* 47, 1391-1405 (1996).
318. "Variations on the Salt-Polymer Electrolyte Theme for Flexible Solid Electrolytes," C. A. Angell, K. Xu, S-S. Zhang and M. Videa, Text of invited lecture at Takahashi Memorial Symposium, 7th International Conf. Solid State Ionics, Singapore, Dec. 1995, *Solids State Ionics*, 86-88, 17-28 (1996).
319. "Supercooled Liquids and Glasses," M. D Ediger, C. A. Angell and Sidney R. Nagel, invited for Centennial Issue, *J. Phys. Chem.* 100, 13200 (1996).
320. "Polyamorphism and First Order Transitions Between Strong and Fragile Liquid States," C. A. Angell, J. Shao and M. Grabow, text of Plenary Lecture, in *Non equilibrium phenomena in supercooled fluids, glasses and amorphous materials*, M. Giordano, D. Leporini and M. P. Tosi, Eds. (World Scientific: Singapore, 1996) pp. 50-57 (*Proc. Workshop on Dynamics of Liquids and Glasses*, Pisa, Italy, Sept. 25-29, 1995).
321. "The Structure of a Boron Oxyfluoride Glass, an Inorganic Cross-Linked Chain Polymer," Catherine Boussard-Plédel, Marie Le Floch, Gilles Fonteneau, Jacques Lucas, Sourisak Sinbandhit, J. Shao, C. A. Angell, Joël Emergy and J. Y. Buzaré *J. Non-Cryst. Solids*, 209, 247, (1997)
322. "Phase Equilibria, High Conductivity Ambient Temperature Liquids, and Glasses in the Pseudo-Halide Systems $AlCl_3$ -MSCN (M = Li, Na, K)," Changle Liu and C. A. Angell *Solid State Ionics* (Proc. 7th Int. Conf. Sol. State Ionics), 86-88, 467-473 (1996).
323. "Room Temperature Inorganic Quasi-Molten Salts' as Alkali-Metal Electrolytes," K. Xu, S-S. Zhang, C. A. Angell, *J. Electrochem. Soc.* 143, 3548-3554 (1996).
324. "A Novel Electrolyte Solvent for Rechargeable Lithium and Lithium-Ion Batteries," S-S. Zhang and C. A. Angell, *J. Electrochem. Soc.* 143, 4047 (1996).
325. "Inorganic Electrolyte Solutions and Gels for Rechargeable Lithium Batteries," K. Xu, N. D. Day and C. A. Angell, *J. Electrochem. Soc.* 143, L209-L211 (1996).
326. "Current Opinion on the Glass Transition," C. A. Angell, *Current Opinion in Solid State and Materials Science*, 1(4), 578-585 (1996).
327. "Relations Between Unusual Thermodynamic Properties of Liquid Silica and Water," P. H. Poole, M. Hemmati, and C. A. Angell, *Phys. Rev. Lett.* 79, 2281, (1997)
328. "Strong and Fragile Liquids; Glass Transitions and Polyamorphic Transitions in Covalently Bonded Glassformers," C. A. Angell, in *Amorphous Insulators and Semiconductors*, eds. M. F. Thorpe and M. I. Mitkova, NATO-ASI Series, Plenum Press (1997) pp. 1-20.
329. "Entropy and Fragility in Supercooling Liquids," C. A. Angell, APS Symposium Proceedings, *J. Res. NIST* 102, 171 (1997)

330. "IR Absorption of Silicate Glasses by IDCs: I. IR Spectra of SiO₂ Glass in the Rigid Ion Model. Approximation," M. Hemmati and C. A. Angell, *J. Non-Cryst. Sol.*, 217 (1997), 236-249.
331. "Polarization Effects, Network Dynamics, and the Infrared Spectrum of Amorphous SiO₂," M. Wilson, P. A. Madden, M. Hemmati and C. A. Angell, *Phys. Rev. Lett.*, 77, 4023 (1996).
332. "Finite Size Effects in Computer Simulations of the Dynamics of Strong Glass Formers," J. Horbach, W. Kob, K. Binder, C. A. Angell, *Phys. Rev. Rapid Pub. E.*, 54, 5897 (1996).
333. "Glassforming Liquids with Microscopic to Macroscopic Two-State Complexity," C. A. Angell, in "Dynamics of Glass Transition and Related Topics", Ed T. Odagaki, Y. Hiwatari, and J. Matsui. *Prog. Theor. Phys. Supplement No. 126*, 1 (1997) (Yukawa seminar, Nov. 1996),
334. "Polymorphism in Liquids and Glasses," P. H. Poole, Tor Grande, C. A. Angell and P. F. McMillan, *Science* 275, 322-323 (1997).
335. "Landscapes with Megabasins: Polyamorphism in Liquids and Biopolymers and the Role of Nucleation in Folding and Folding Diseases," C. A. Angell (Proc. Los Alamos Workshop, May 1995), *Physica D*, 107, 122-142, 1997.
336. "The Viscous Liquid/Glassy Solid Problem," C. A. Angell, Ch. in *Supercooled Liquids: Advances and Novel Applications*, Ed. J. Fourkas, D. Kivelson, U. Mohanty, and K. Nelson; ACS Symposium Series 676, pp. 15-26; ACS, Washington, D.C. 1997.
337. "Polyamorphic Transitions in Network Forming Liquids and Glasses," J. L. Yarger, C. A. Angell, S. S. Borick, and G. H. Wolf, Ch. in *Supercooled Liquids: Advances and Novel Applications*, Ed. J. Fourkas, D. Kivelson, U. Mohanty, and K. Nelson; ACS Symposium Series 676; ACS, Washington, D.C. 1997.
338. "The Glassy State Problem: Failure to Crystallize, and Vitrification," C. A. Angell, Proc. Int. School of Physics, "Enrico Fermi" Course CXXXIV edited by F. Mallamace and H. E. Stanley, IOS Press Amsterdam, 1997, p. 571.
339. "Ionic Transport and Heat Capacity of Glass-Forming Metal-Nitrate Mixtures," A. Pimenov, P. Lunkenheimer, M. Nicklas, R. Bohmer, A. Loidl, and C. A. Angell, *J. Non-Cryst. Sol.* 220, 93-101, (1997).
340. "Radiation effects in glasses used for immobilization of high-level waste and plutonium disposition," W. J. Weber, R. C. Ewing, C. A. Angell, G. W. Arnold, A. N. Cormack, J. M. Delaye, D. L. Griscom, L. W. Hobbs, A. Navrotsky, D. L. Price, A. M. Stoneham, and M. C. Weinberg, *J. Mater. Res.* Vol. 12, No. 8, Aug 1997.
341. "Entropy, Fragility, "Landscapes," and the Glass Transition," C. A. Angell, in "Complex Behavior of Glassy Systems" (Proc. 14th Sitges Conference on Theoretical Physics, 1996) Ed. M. Rubi, Springer, 1997, p. 1.
342. "Thermodynamic Aspects of the Glass Transition Phenomenon II. Molecular Liquids with Variable Interactions," C. Alba, J. Fan, and C. A. Angell, *J. Chem. Phys.* 110, 5262 (1999).
343. "A New Interpretation of Liquid-Liquid Unmixing in Classical Alkali Silicate Glasses," C. A. Angell, P. H. Poole and M. Hemmati, Proc. 12th East European Glass Conf. (Varna, Bulgaria), Eds. B. Samunova and Y. Demetrew, 1998, pp.100-109
344. "High Anodic Stability of a New Electrolyte Solvent: Unsymmetric Non-Cyclic Aliphatic Sulfone," K. Xu and C. A. Angell, *J. Elec. Chem. Soc.* 145, L70 (1998).
345. "Entropy and Fragility in Polymers, and the Cp Problem," C. A. Angell, in "Structure and Properties of Glass Polymers" ACS Symposium Series 710, Eds. M. Tant and A. Hill, American Chemical Society: Washington, DC, 1998, p. 37.
346. "The Nature of Glassforming Liquids, the Origin of Superionics and 'Tight' vs. 'Loose' Glassy Conductors," C. A. Angell, Proc. workshop on Superionic Glasses, Schloss R. Germany, May 1997, *Solid State Ionic* . 105, 15-24, 1998.
347. "Comparison of Pair Potential Models for the Simulation of Liquid SiO₂: Thermodynamic and Diffusional Properties." M. Hemmati and C. A. Angell, Physics meets Mineralogy" Eds. H. Aoki and R. Hemley. Cambridge Univ. Press, Chap. 6.1, pp. 325-339.
348. "Dynamics of Glassforming Liquids. IV: On the link between Molecular Dynamics and Configurational Entropy" R. Richert, and C. A. Angell, *J. Chem. Phys.* 108, 9016 (1998).
349. "Liquid Landscapes" C. A. Angell, *Nature (News & Views)* 393, 521-522 (1998).
350. "Thermodynamic determination of fragility in liquids and a fragile-to-strong liquid transition in water," K. Ito, C. T. Moynihan and C. A. Angell, *Nature* 398, 492-495 (1999).
351. "Rigidity, Fragility, Bond Models and the 'Energy Landscape' for Covalent Glassformers," C. A. Angell, in "Rigidity Theory and Applications", Ed. M. F. Thorpe and P.M. Duxbury (Kluwer Academic/Plenum Publishers, New York, 1999), pp. 297-314.
352. "Rubbery Electrolytes," C. A. Angell, Ed. H. Wendt Molten Salt Forum Vols. 5-6, 39-42 (1998).
- 352(a). "Thermal and Electrical Properties of Li₂O - V₂O₅ - TeO₂ Glassy System," MRS Proceedings, E. Sanchez and C. A. Angell, *Sol. St. Ionics V* 548, 245-250.
353. "From simple electrolyte solutions through polymer electrolytes to superionic rubbers: Some fundamental considerations," C. A. Angell, C. T. Imrie and M. D. Ingram, *Polymer Internat.* 47, 9-15 (1998).
354. "Amorphous Polymorphism in ice investigated by inelastic neutron scattering," H. Schober, M. Koza, A. Tölle, F. Fujara, C. A. Angell and R. Bohmer, *Physica B* 241-243, 897-902 (1998).

355. "Comment on 'Structure of Supercooled Liquid Silicon' by Ansell *et al.*," C. A. Angell and S. S. Borick, *J. Phys.: Condens. Matter* 11, 8163-8166 (1999).
356. "Fragility in Liquids and Polymers New Simple Quantifications and Interpretations," J. L. Green, K. Ito, K. Xu and C. A. Angell, *J. Phys. Chem. B*, 103, 3991-3996 (1999).
357. "Glasses and glass formation," Chapter 1 in the book "Insulating and Semi-conducting Glasses," Ed. P. Boolchand, World Scientific Pub., Singapore, (in press).
358. "Competitive Interactions and Glassy State Extension in Lithium Salt Solutions," A. Sivaraman, H. Senapati and C. A. Angell, *J. Phys. Chem. B* 103, 4159-4163 (1999).
359. "Simple glassformers, fragilities and landscape excitation profiles," C. A. Angell, B. E. Richards and V. Velikov, Proceedings of Pisa Relaxations Conference - Oct 1998, special issue of *J. Phys.: Condens. Matter* 11, A75-A94 (1999).
360. "Glass Formation, Ionic Conductivity, and Conductivity/Viscosity Decoupling, in LiAlCl₄ + LiClO₄ and LiAlCl₄ + LiAlCl₃·Imide Solutions," M. Videa and C. A. Angell, *J. Phys. Chem. B* 103 (20), 4185-4190 (1999).
361. "Glassformer Fragilities and Landscape Excitation Profiles by Simple Calorimetric and Theoretical Methods," C. A. Angell, J. L. Green, K. Ito, P. Lucas and B. E. Richards, *J. Thermal Analysis and Calorimetry* 57, 717-736 (1999).
362. "Relaxation in glassforming liquids and amorphous solids", C. A. Angell, K. L. Ngai, G. B. McKenna, P. F. McMillan and S. W. Martin, *J. Appl. Phys.* 88(6), 3113-3157 (2000).
363. "Glass Transitions and Folding Transitions in Complex Systems," C. A. Angell, in "Hydration Processes in Biology" Ed. M.-C. Bellissent-Funel, NATO-ASI series, IOS Press: Netherlands, 1999, pp. 127-139.
364. "Molecular and anionic polymer and oligomer systems with micro-decoupled conductivities," S.-S. Zhang, Z. Chang., K. Xu and C. A. Angell, *Electrochimica Acta* 45, 1229-1236 (2000).
365. "A new protonation chemistry of phosphazenes and the formation of bis(sulfonyl)imides," K. Xu, N. D. Day, and C. A. Angell, *Inorganic Chem. Comm.* 2, 261-264 (1999).
366. "Ideal and Cooperative Bond-Lattice Representations of Excitations in Glass-Forming Liquids: Excitation Profiles, Fragilities, and Phase Transitions," C. A. Angell and C. T. Moynihan, *Met. Mat. Trans. B* 31B, 587-596 (2000).
367. "Effect of N-substituents on protonation chemistry of trichlorophosphazenes," K. Xu and C. A. Angell, *Inorganica Chimica Acta* 298, 16-23 (2000).
368. "Pressure induced crystallization of vitreous ZnCl₂," C. H. Polsky, L.-M. Martinez, K. Leinenweber, M. A. VerHelst, C. A. Angell and G. H. Wolf, *Phys. Rev. B* 61(9), 5934-5938 (2000).
369. "10 questions on glassformers, and a real space 'excitations' model with some answers on fragility and phase transitions," C. A. Angell, *J. Phys.: Condens. Matter* 12, 6463-6475 (2000).
370. "Water and its anomalies in perspective: tetrahedral liquids with and without liquid-liquid phase transitions," C. A. Angell, R. D. Bressel, M. Hemmatti, E. J. Sare and J. C. Tucker, *Phys. Chem. Chem. Phys.* 2, 1599-1566 (2000).
371. "Interpretation of the molten BeF₂ viscosity anomaly in terms of a high temperature density maximum, and other waterlike features," M. Hemmati, C. T. Moynihan and C. A. Angell, *J. Chem. Phys.* 115(14), 6663-6671 (2001).
372. "Bond lattice or excitation model analysis of the configurational entropy of molecular liquids," C. T. Moynihan and C. A. Angell, *J. Non. Cryst. Solids* 274, 131-138 (2000).
373. "'Strong' and 'superstrong' liquids, and an approach to the perfect glass state via phase transition," C. A. Angell, C. T. Moynihan and M. Hemmati, *J. Non. Cryst. Solids* 274, 319-331 (2000).
374. "Quantification of Fragility in Viscous Liquids and Polymers. II. Reduced width of the Glass Transition," K. Ito, C. A. Angell and C. T. Moynihan (to be published).
375. "A Fusible Orthoborate Lithium Salt with High Conductivity in Solutions," W. Xu and C. A. Angell, *Electrochem. and Solid State Lett.*, 3(8), 366-368 (2000).
376. "The amorphous state equivalent of crystallization: new glass types by first order transition from liquids, crystals, and biopolymers," C. A. Angell, *Solid State Sciences* 2(8), 791-805 (2000). (Honig Honor)
377. "Synthesis and Diagnostic Electrochemistry of Nanocrystalline Li_{1+x}Mn_{2-x}O₄ Powders of Controlled Li Content," P. Lucas and C. A. Angell, *J. Electrochem Soc.* 147, 4459-4463 (2000).
378. "LiBOB and Its Derivatives: Weakly Coordinating Anions, and the Exceptional Conductivity of Their Nonaqueous Solutions," W. Xu and C. A. Angell, *Electrochem. Solid-State Letters* 4(1), E1-E4 (2001).
379. "Acid-in-chain versus 'base-in-chain' anionic polymer electrolytes for electrochemical devices," X. Sun and C. A. Angell, *Electrochimica Acta* 46, 1467-1473 (2001).
380. "Ionic Conductivity and Electrochemical Stability of Poly[oligo(ethylene glycol)oxalate]-Lithium Salt Complexes," W. Xu, J.-P. Belieres and C. A. Angell, *Chem. Mater.* 13 (2), 575-580 (2001).
381. "The Glass Transition," C. A. Angell, *Pergamon Encyclopedia of Materials: Science and Technology*, 3365 (vol 4), (2001) .
382. "A thermodynamic connection to the fragility of glassforming liquids," L.-M. Martinez and C. A. Angell, *Nature* 410, 663-667 (2001).
383. "Hi Li⁺ Self-Diffusivity and Transport Number in Novel Electrolyte Solutions," M. Videa, W. Xu, B. Geil, R. Marzke, and C. A. Angell, *J. Electrochem. Soc.* 148(12), A1352-A1356 (2001).

384. (WOT)"Water: What We Know and What We Don't." C. A. Angell, *Water Science for Food, Health, Agriculture and Environment*, Ed. Z. Berk, R. B. Leslie, P. J. Lilford and S. Mizrahi, Lancaster: Technomic Publishing Co., Inc. ISOPOW 8, 1-30 (2001).
385. "Polyanionic electrolytes with high alkali ion conductivity," X. Sun, W. Xu, S.-S. Zhang and C. A. Angell, *J. Phys.: Condens. Matt.* 13, 8235-8243 (2001).
386. "Polymer Electrolyte Photoelectrochemical Cells with Involatile Plasticizers. I. The n Si / I⁻ / I₂ cell," S. Özer, J. Javorniczky and C. A. Angell, *J. Electrochem. Soc.* 149(2), (2002).
387. "Oxide ion conducting glasses: Synthetic strategies based on liquid state and solid state routes," S. Jacob, J. Javorniczky, G. H. Wolf and C. A. Angell, *Intern. J. of Inorg. Materials* 3, 241-251 (2001).
388. "The Glass Transition of Water, Based on Hyperquenching Experiments," V. Velikov, S. Borick and C. A. Angell, *Science* 294, 2335-2338 (2001).
389. "Molecular Glasses with High Fictive Temperatures," V. Velikov, S. Borick and C. A. Angell, *J. Phys. Chem.* 106, 1069-1080 (2002).
390. " Prediction of entropy and dynamic properties of water below the homogeneous nucleation temperature" F. W. Starr, C. A. Angell, and H. E. Stanley, *Physica*, A3223, 51-66 (2003).
391. "Preparation and characterization of novel polyMOB polyanionic solid electrolytes with weak coulomb traps," W. Xu and C. A. Angell, *Solid State Ionics* 147 (3-4): 295-301 APR (2002)
392. "Origin and control of low-melting behavior in salts, polysalts, salt solvates, and glassformers," C. A. Angell, in *Molten Salts: From Fundamentals to Applications* Ed. M. Gaune-Escarde, NATO-ASI, Kluwer Academic Pub., Delft, 2002, pp . 305-322.
393. "Cooperative disordering phase transitions in liquids, crystals, and mesoscopic (single molecule) systems," C. A. Angell and S. Borick, in V. V. Brazhkin. S. V. Buldyrev, V. N. Ryzhov, and H. E. Stanley [eds], {it New Kinds of Phase Transitions: Transformations in Disordered Substances} [Proc. NATO Advanced Research Workshop, Volga River] (Kluwer, Dordrecht, 2002).
394. "LiBOB as a salt for lithium ion batteries: a possible solution for high temperature operation," K. Xu, S.-S. Zhang, R. Jow, W. Xu and C. A. Angell, *Electrochem. Solid State Letters* 5(1), A26-A29 (2002).
395. "Liquid Fragility and the Glass Transition in Water and Aqueous solutions," C. A. Angell, *Chem. Rev.* (special thematic issue on Water), 102, 2627-2649, (2002)
396. "Novel polyanionic solid electrolytes with weak coulomb traps and controllable caps and spacers," W. Xu, M. D. Williams and C. A. Angell, *Chem. Mater.* 14(2) 401-409 (2002).
397. "Sulfone-based Electrolytes for Lithium Ion Batteries," K. Xu and C. Austen Angell, *J. Electrochem. Soc.* 149, A920-A926 (2002)
(Journal correction *J Electrochem. Soc* 149 (8): L7-L7 AUG 2002)
398. ""Structures of orthoborate anions and physical properties of their lithium salt non-aqueous solutions," W. Xu, A. Shusterman, M. Videa, V. Velikov, R. L. Marzke and C. A. Angell, *J. Electrochem. Soc.* 150, E74-80, (2003)
399. "Specific heats C_p, C_v, C_{conf}, in relation to the energy landscapes and fragilities of glassforming liquids," C. A. Angell and S. Borick, *J. Non-Cryst. Sol.* 307-310, 393-406 (2002) xxx.lanl.gov/abs/cond-mat/0202304
400. "Chemical order lifetimes in liquids and a new fictive temperature for glassformers," Luz-Maria Martinez and C. Austen Angell, *Physica A: Statistical Mechanics and its Applications* 314, 548-559 (2002).
xxx.lanl.gov/abs/cond-mat/0202305
401. "Calorimetric studies of the energy landscapes of glassformers by hyperquenching methods," C. Austen Angell, *J. Thermal Analysis* 69, 785-794 (2002)
400. "Chemical order lifetimes in liquids and a new fictive temperature for glassformers," Luz-Maria Martinez and C. Austen Angell, *Physica A: Statistical Mechanics and its Applications* 314, 548-559 (2002).
xxx.lanl.gov/abs/cond-mat/0202305
401. "Calorimetric studies of the energy landscapes of glassformers by hyperquenching methods," C. Austen Angell, *J. Thermal Analysis* 69, 785-794 (2002)
402. "Liquid-liquid phase transition in supercooled liquid silicon," Srikanth Sastry and C. Austen. Angell, *Nature Materials* 2, 739-743 (2003)
403. "Limiting tensions for liquids and glasses from laboratory and MD studies," Q. Zheng, J. Green, J. Kieffer, P. H. Poole, J. Shao, G. H. Wolf, and C. A. Angell, in *Liquids under Negative Pressures* NATO-ASI, Kluwer Academic Pub., 2002, pp. -46. (Liquids Under Negative Pressure ARW is available in pdf: http://www.kfki.hu/~pressure/meeting/table_ofcontents.pdf)
404. Direct determination of kinetic fragility indices of glassforming liquids by differential scanning calorimetry: Kinetic vs. thermodynamic fragilities" L. Wang, V. Velikov and C. A. Angell, *J. Chem Phys.*, 117 (22), 10184-10191 (2002)
405. "Ionic conductivities of hybrid inorganic sulfide-polyether electrolytes," A. Hayashi, L.-M. Wang, and C. A. Angell, *Electrochimica Acta.* 48, 2003-2008, (2003)
406. "PoLiMOB-lithium salt complexes: from salt-in-polymer to polymer-in-salt electrolytes," W. Xu, L. Wang, and C. A. Angell, *Electrochimica Acta*, 48, 2037, (2003)
407. "Polymer electrolytes from plasticized polymobs and their gel forms, W. Xu and C. A. Angell, *Electrochimica Acta* 48, 2029-2035 (2003)
408. "Anion-trapping and polyanionic electrolytes based on acid-in-chain borate polymers, W. Xu, X.-G. Sun, and C. A. Angell, *Electrochimica Acta*, 48, 2255-2266, (2003)

409. Clarifying the glass transition behavior of water by comparison with hyperquenched inorganic glasses. Y-Z, Yue and C. A. Angell, *Nature*, 427, 717-721, 2004
410. "Phase transitions in liquids and glasses: their origin, and possible links to switching behavior," C. A. Angell. invited for OVSHINSKY "Physics and Applications of Disordered Materials". Editor: M. Popescu, INOE, 2002, Chap. 1 p. 1-18.
411. "Electrospray techniques for the study of liquid energetics by hyperquenched glass calorimetry" Li-Min Wang., Steve Borick., and C. Austen Angell, *Phys. Rev.B*, (submitted)
412. " Hyperquenching + cold equilibration strategies for the study of liquid-liquid and protein folding processes". C. Austen Angell and Limin Wang., (invited for special issue of *Biophys. Chem. (Festschrift for Walter Kauzmann)* 105, 621-637 (2003)
413. "Ionic Liquids: Ion Mobilities, Glass temperatures and fragilities." Wu Xu, E. I. Cooper and C. Austen Angell, *J. Phys Chem. B* 107(25), 6170, (2003)
414. Transport-Vapor Pressure Relations, and Fragility in Ionic Liquids. C. A. Angell, Wu Xu, M. Yoshizawa, A. Hayashi, and J.-P. Belieres. in the book *Ionic Liquids*, Ed. M. Ohno, (in Japanese: English language version available on request).
415. High conductivity of superionic-glass-in-ionic-liquid solutions. A. Hayashi et al, *Electrochemical and Solid State Letters* 6, E19-E22 (2003)
416. Potential Energy, Relaxation, Vibrational Dynamics and the boson peak, of hyperquenched glasses. C. A. Angell, Yuanzheng Yue, Limin Wang, John R. D. Copley, Steve Borick and Stefano Mossa. *J. Phys. Cond Matt* 15, , S1051-S1068 (2003)
417. "Response to "Comment on 'Direct determination of the fragility indexes of glassforming liquids by differential scanning calorimetry. Kinetic vs thermodynamic fragilities'" Limin Wang and C. A. Angell, *J. Chem. Phys.* 118, 10353-10355 (2003)
418. Ionic liquids of chelatoborates as model glassformers. Wu Xu Limin Wang, Ronald Nieman and C. A. Angell., *J. Phys. Chem.B*, 107, 11749-11756 (2003)
419. Ionic liquids by proton transfer : vapor pressure and conductivity, and the relevance of ΔpK_a from aqueous solutions. . M. Yoshizawa*, Wu. Xu, and C. A. Angell, *J. Am. Chem. Soc.*, 125, 13411-15419 (2003)
420. Recent Results on the connection between thermodynamics and dynamics in Supercooled water F. W. Starr, C. A. Angell. Emilia la Nave Srikanth Sastry, Antonio Scala, Francesco Sciortino and H. Eugene Stanley, *Biophys. Chem.* 105, 573-583, (2003)
421. New Sulfone Electrolytes II with Cyclo alkyl groups for non-exfoliation of graphite anodes. Xiao-Guang Sun and C. Austen Angell. *Solid State Ionics*, 175, 257-260 (2004)
422. New single ion conductors ("polyBOP" and analogs) for rechargeable lithium batteries. . Xiao-Guang Sun and C. Austen Angell, *Solid State Ionics*, 175, 743-746, (2004)
423. Ionic liquids: Inorganic vs. organic, protic vs. aprotic, and Coulomb control vs. van der Waals control, C. Austen Angell, Wu Xu, Masahiro Yoshizawa and Jean-Philippe Belieres in *Ionic Liquids*, (International Symposium in honour of Marcelle Gaune-Escard) Eds H. Oye, A. Jagtoyen et al. pp389-398.
424. "Solvent-free electrolytes with aqueous solution-like conductivities. Wu Xu and C. A. Angell, *Science*, 302, 422-425, October 17 issue, (2003)
425. LiMOB, an unsymmetrical nonaromatic orthoborate salt for non-aqueous solution electrochemical applications. Xu W, Shusterman AJ, Marzke R, et al. *J. Electrochem. Soc* 151 (4): A632-A638 2004
426. Raining Lead around 250 mya: a smoking gun for an Australian impact origin for the Permo-Triassic extinction" Jim C. Standard and C. Austen Angell,) arxiv.org/pdf/physics/0311111
427. "Vibrational dynamics and thermodynamics, ideal glass transitions and folding transitions, in liquids and biomolecules", C. Austen Angell, Li-min Wang, Stefano Mossa, and John R.D. Copley, A. I. P. Conference Proceedings ("Slow Dynamics" 2003), 708, 473 (2004).
428. ACS (NewYork) Abstract: Ionic liquids by proton transfer, delta PKA, and the ionic liquid fuel cell Yoshizawa M, Belieres JP, Xu W, Angell CA ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY 226: U627-U627 083-IEC Part 1 SEP 2003
429. "Amorphous Water". C. A. Angell, *Annu. Rev. Phys. Chem.* 5, 559—583, 2004
430. The glass transition temperature of water: a simulation study" N. Giovambattista, C. A. Angell, F. Sciortino, and H. E. Stanley, *Phys. Rev. Lett.* 93(4)4, 047801 (2004)
431. Thermodynamics and dynamics of glass formation " C. A. Angell and J.L Green, for "Lyophilization of Biopharmaceuticals." Eds., M. Pikal and R Constantino, AAPS press, 2005, pp 367-422.
432. "Physical Chemistry of Ionic Liquids, Inorganic and organic, Protic and Aprotic". C. A. Angell, Wu Xu, M. Yoshizawa, A. Hayashi, J.-P. Belieres, P. Lucas and M. Videa, *Chemistry of Ionic Liquids* ed H. Ohno. Wiley Interscience, 2005. Ch. 2, pp 5-23,
433. "Dielectric studies deny existence of ultraviscous fragile water." Ayumi Minoguchi, Ranko Richert and C. Austen Angell. *Phys. Rev. Lett.* 93, 215703 (2004).
434. "Energy Landscapes for cooperative processes: nearly ideal glass transitions, liquid-liquid transitions, and folding transitions", C. A. Angell, (from Royal Society Discussion) *Philos. Trans. Roy. Soc.* 363, 415-432, (2005)
435. "Boson peaks and floppy modes: some relations between constraint and excitation phenomenology, and interpretation, of glasses and the glass transition" C Austen

- Angell *J. Phys.: Condens. Matter* 16 S5153-S5164 (2004) (Thorpefest)
436. "Dielectric relaxation in aqueous solutions of hydrazine and hydrogen peroxide", Ayumi Minoguchi, Ranko Richert and C. Austen Angell, *J. Phys. Chem. (Stillinger Festschrift)*, 108,19825-19830 (2004)
437. New Sulfone Electrolytes for Rechargeable Lithium Batteries. Part I. Oligoether Containing Sulfones Xiao-Guang Sun, C. Austen Angell, *Electrochem. Commun.*, 7, 261-266, (2005)
438. Y-Z Yue and C. A. Angell, Response to Kohl et al, Brief Communications Arising, *Nature*, 435, E1-2, (2005),
439. Two-Gaussian excitations model for the glass transition Dmitry V. Matyushov and C. A. Angell, *J. Chem. Phys.* 123, 034506 (2005) (12 pages).
440. "Structural Relaxation in the glass transition region of water", Nicolas Giovambattista, C. Austen Angell, Francesco Sciortino and H. E. Stanley, *Phys. Rev. E* 72, 011203 (2005)
441. Tuning the tetrahedrality of a silicon potential reveals a series of monatomic (metal-like) glasses of very high fragility. Valeria Molinero*, Srikanth Sastry# and C. Austen Angell*. PRL (submitted) <http://arxiv.org/abs/cond-mat/0510292>
442. "The Boson peak in Melt-formed and Damage-formed Glasses: a Defect Signature?" Harish Bhat, Inmaculada Peral John R. D. Copley, and C. Austen Angell, *J. Non-Cryst. Sol.*, 352, 4517-4524 (2006)
443. "Highly decoupled ionic and protonic solid electrolyte systems, in relation to other relaxing systems and their energy landscapes". F. Mizuno*, J.-P. Belieres*, N. Kuwata@\$, A. Pradel@, M. Ribes@, and C. A. Angell*
444. "Fragility and Thermodynamics in non-polymeric glassformers," Limin Wang, C. Austen Angell and Ranko Richert. *J. Chem. Phys.* 125, 074506, (2006)
445. "Thermodynamics and dynamics of the two-scale spherically-symmetric Jagla model of anomalous liquids," Limei Xu, Sergey V. Buldyrev, C. Austen Angell, H. Eugene Stanley, *J. Chem. Phys.* E 74, 031108 2006
446. "Binary Inorganic salt mixtures as high conductivity electrolytes for >100°C fuel cells" J.-P. Belieres, D. s, and C. A. Angell, *Chem. Commun.* 4799-4801(2006), DOI: 10.1039/b611150e
447. Protic ionic liquids: Preparation, characterization , and the proton transfer energy level diagram.. (invited for special issue on Ionic Liquids. J.-P. Belieres and C. A. Angell, *J. Phys. Chem. B*, 111 (18), 4926 -4937 (2007). 10.1021/jp067589u S1520-6106(06)07589
448. "Gaussian excitations model for glass-former dynamics and thermodynamics", Dmitry V. Matyushov and C. Austen Angell, *J. Chem. Phys.*, 126, AN 094501 (2007) (March 6
449. (a) (b) Ionic Liquids in the temperature range 150-1500K and the time span 1800-2007. C. Austen Angell, in **Molten Salts and Ionic Liquids: Never the Twain?** Edited by Marcelle Gaune-Escard and Kenneth R. Seddon Copyright _ 2009 John Wiley & Sons, Inc.
- 449.
450. **Vitrification of a monatomic metallic... liquid". H Bhat, V. Molinero, V. Solomon, E. Soignard, S. Sastry, J. L. Yarger, and C. A. Angell. (Nature, 448(Aug.16), 787-790, (2007)**
451. *Reversible folding-unfolding, aggregation protection, multi-year stabilization in high concentration protein solutions." Nolene Byrne, Limin Wang, Jean-Philippe Belieres, and C. Austen Angell. *Chem. Commun.* 2714-2716, (2007) DOI: 10, 1039/b618943a.
452. Glass transition dynamics in water and other tetrahedral liquids: "order-disorder" transitions vs. "normal" glass transitions. C. A. Angell, *J. Phys.: Condens. Matter* 19 (2007) 205112.
453. An electrospray technique for hyperquenched glass calorimetry studies: propylene glycol and dibutylphthalate. Limin Wang and C. Austen Angell, *J. Non-Cryst. Solids* , 353, 3829-3837 (2007)
454. "Glassformers and viscous liquid slowdown since David Turnbull: Enduring puzzles and new twists." C.A. Angell, (text of Turnbull lecture, MRS, 2006) *MRS Bulletin*, 33(5), 545-555, May 2008
455. Highs and Lows in the density of water" C . A. Angell, *Nature Nano (News &Views)* 2, 1-4, (2007)
456. Prediction of macroscopic properties of protic ionic liquids by ab initio calculations. H. Markusson, J.-P. Belieres, P. Johansson, C. A. Angell and P. Jacobsson. *J. Phys. Chem.* 111, 8717-8723 (2007)
457. Parallel developments in inorganic, aprotic, and protic ionic liquids: physical chemistry and applications" C. Austen Angell, Nolene Byrne" and Jean-Philippe Belieres, *Accounts of Chemical Research* (special issue), 40, 1228-1236, (2007)
458. Directed destabilization of lysozyme in protic ionic liquids reveals a new low energy reversibly unfolding (pre-fibril) state. Nolene Byrne, Jean-Philippe Belieres, C. Austen Angell, arXiv.org/abs/0710.3807.
459. "Protein unfolding, and the "tuning in" of reversible intermediate states, in protic ionic liquid media". N. Byrne and C.A. Angell. *J. Molecular Biology* 378, 707-714, (2008)
460. "Insights into Phases of Liquid Water from Study of Its Unusual Glass-Forming Properties," C.A. Angell, *Science* 319, 582, (2008)
461. "Glass formation and glass transition in supercooled liquids, with insights from study of related phenomena in crystals". (based on opening talk ICNAS, Brazil 2007) C.A. Angell, *J. Non-Cryst. Solids* 354 (2008) 4703-4712 (<http://dx.doi.org/10.1016/j.noncrsol.2008.05.054>

- 462 "Landscape thermodynamics and dynamics of a monatomic glassformer- the modified Stillinger-Weber model", Vitaliy Kapko, Dmitry Matyushov and C. Austen Angell. *J. Chem. Phys.* 128, 144505 (2008)
463. "A Fluorinated Ionic Liquid as a High-Performance Fuel Cell Electrolyte", Jeffery Thomson, Patrick Dunn, Lisa Holmes, Jean-Philippe Belieres, Charles A. Angell, and Dominic Gervasio, *ECS Trans.* 13 (28), 21 (2008)
464. Model monatomic system with a liquid-liquid critical point and two distinct glassy states" Limei Xu, Sergey V. Buldyrev, Nicolas Giovambattista, C. Austen Angell and H. Eugene Stanley, *J. Chem. Phys.*, **130**, 054505 (2009)_
465. Electron free energy levels in oxidic solutions: relating oxidation potentials in aqueous and non-aqueous systems" C. A. Angell, *J. Solid State Electrochem. (Bockris Festschrift)*, **13**, 981 (2009) .DOI: **10.1007/s10008-008-0775-0** (published online)(2009)
466. Formation, and dissolution, of hen egg white lysozyme amyloid fibrils in protic ionic liquids", Nolene Byrne and C. Austen Angell, *Chem. Commun.* 1046-1048 (2009), DOI:10.1039/B817590J
467. "The "refoldability" of selected proteins in ionic liquids as a stabilization criterion, leading to a conjecture on biogenesis". Nolene Byrne, Jean-Philippe Belieres and C. Austen Angell, *Aust. J. Chem.* **62**(4), 328–333 (2009) <http://www.publish.csiro.au/nid/51/paper/CH08441.htm>
468. "Protein folding in the protic ionic liquid milieu: from native conformation to fibril". Nolene Byrne and C. Austen Angell, *Chimica Oggi-Chemistry Today*, 27, 51-53, (2009) (Jan-Feb)
469. "Composition dependence of the solid state transitions in NaNO₃/KNO₃ mixtures" P. Wen, P. Harrowell, N. Byrne, and C. A. Angell. *Thermochemica Acta* **486** 27-31 (2009)
470. "Hydrogen Redox in Protic Ionic Liquids and a Direct Measurement of Proton Thermodynamics", J. A. Bautista-Martinez, L. Tangl, J-P. Belieres, R. Zeller, C.A. Angell, *J. Phys. Chem.* 113, 12586-12593 (2009)
- 471 Response to "Comment on "Dynamic aspects of the liquid-liquid phase transformation in silicon" [*J. Chem. Phys.* 129, 104503 (2008)]. Noel Jakse, Srikanth Sastry and C. Austen Angell, *J. Chem. Phys.* 130, 247103 (2009)
- 472 "Doped Sulfone electrolytes for high voltage Li-ion cell applications." Xiaoguang Sun and C. Austen Angell" *Electrochemistry Commun.* 11 (2009) 1418–142
- 473" Structure-energy relations in hen egg white lysozyme observed during refolding from a quenched unfolded state" Theresa Y. Cho, Nolene Byrne, David J. Moorec, Brian A. Pethica, C. Austen Angell and Pablo G. Debenedetti. *Chem. Commun.* 4441-4443, (2009)
- 474 "Unusual phase behavior of one component systems with two-scale isotropic interactions", S.V. Buldyrev et al., *J. Chem. Phys.*? *J. Phys. Cond. Matter* 21, 504106, (2009)
- 475 Soft is Strong. C. A. Angell and K. Ueno, *Nature*, (News and views) 462, 45-46, (Nov. 2009)
- 476 The Solubility of Hen Lysozyme in Ethylammonium Nitrate/H₂O Mixtures and a Novel Approach to Protein Crystallization, N. Byrne and Angell, *C. A. Molecules* **2010**, *15*, 793-803; doi:10.3390/molecules15020793
- 477 Guest-free monolayer clathrate and its coexistence with two-dimensional high-density ice. Jael Bai†, C. Austen Angell‡, Xiao Cheng Zeng PNAS, 107, 5718–5722 (2010) (NSF ackn. OK)
- 478 Glass transition and fragility in the simple molecular glassformer CS₂ from CS₂-S₂Cl₂ solution studies. Zuofeng Zhao, Ranko Richert and C. Austen Angell, *J. Chem. Phys.* **132**, 154505 (2010)_
- 479 Relaxation dynamics and ionic conductivity in a fragile plastic crystal, Thomas Bauer, Melanie Köhler, Peter Lunkenheimer, Alois Loidl, and C.A. Angell, *J. Chem. Phys.* 133, 144509 (2010)
480. Glass transition with decreasing correlation length during cooling of Fe₅₀Co₅₀ superlattice and strong liquids. Shuai Wei, Isabella Gallino, Ralf Busch & C. Austen Angell, *Nature Physics*, 7, 178-182 (2011) online Nov. 28 (DOI:10.1038/NPHYS1823 (2010)
481. "Heat capacity and entropy functions in strong and fragile glassformers, relative to those of disordering crystalline materials". C. A. Angell, **Chapter** in *Hot Topics in Thermal Analysis and Calorimetry*, Ed. Y. Sestak, Springer 2010.
482. From Slags to Molten salts to Ionic liquids- a 50 year Joyride. C. Austen Angell, (ECS Bredig Award article). *Electrochemical Soc. Transactions*, **33** (7) **3-18** (2010).
- 483 Molecular Engineering of the Glass Transition: Glass Forming Ability across a Homologous Series of Cyclic Stilbenes," Ping Wen, Daniel Paraska, Robert Baker, Peter Harrowell and C. Austen Angell. *J. Phys. Chem. B*, 115, 4696 (2011) dx.doi.org/10.1021/jp110975y
484. "Fast and slow components in the crystallization of a model multicomponent system, NaKCa(NO₃): the role of composition fluctuations." Ping Wen, Peter Harrowell and C. Austen Angell, *J. Phys. Chem. A*, **115**, 6260-6268 (2011) dx.doi.org/10.1021/jp111835z
485. On the decoupling of relaxation modes in a molecular liquid caused by isothermal introduction of 2nm structural inhomogeneities. K. Ueno and C. A. Angell, *J. Phys. Chem. B* **115**, 13994-13999 (2011) (online) dx.doi.org/10.1021/jp111398r
- 486 The glass transition temperature of the P₂O₅-H₂O system revisited, and support for Mishima's conjecture on solvent water at low temperature. Horacio R. Corti*, Federico J. Nores-Pondal, C. Austen Angell. *Phys. Chem. Chem. Phys.* (special issue on Water) 2011, Advance Article **DOI: 10.1039/C1CP22185J**
487. Prigogine and Defay say Relax, C. Austen Angell and Iolanda Santana Klein, *Nature Physics (News and Views)* Vol. 7, 750-751, (2011)

488. High conductivity, and "dry" proton motion, in guanidinium salt melts and binary solutions. Zuofeng Zhao, Kazuhide Ueno and C. Austen Angell, *J. Phys. Chem. B.* **115**, 13467-13472 (2011) dx.doi.org/10.1021/jp206491z |
489. see 499 for final printing) Potential-tuning molecular dynamics studies of fusion, and the question^{1,2,3} of ideal glassformers: (I) The Gay-Berne model. Vitaliy Kapko, Dmitry V. Matyushov, and C. Austen Angell, arxiv. cond-mat.soft physics.chem-phys.
- 490.. Protic Ionic Liquids Based on Decahydroisoquinoline: Lost Superfragility and Ionicity-Fragility Correlation Kazuhide Ueno,[†] Zuofeng Zhao,[†] Masayoshi Watanabe,[‡] C. Austen Angell *J. Phys. Chem. B.* **115**,13994-13999 (2011) <http://dx.doi.org/10.1021/jp2078727>
491. Slow but complete, two-state unfolding/refolding of lysozyme in "tuned" ~6M guanidinium carboxylate solutions. Zhao ZF, Angell CA ArXiv 1111.5647 (2011)
492. Ionic Liquids: Past, Present and future" C. Austen Angell, Younes Ansari, and Zuofeng Zhao, *Faraday Discussion* **154**, 9-27, (2012)
493. Anharmonicity of quasilattice modes in glass and superfragile liquid states of decahydroisoquinoline. Marie Plazanet, Helmut Schober and C. Austen Angell. *J. Chem. Phys.* **136**, 136101 (2012); doi: 10.1063/1.3698167
494. "Clearing the water " *Nature Materials* (News and Views on paper by Murata and Tanaka), April 27, **11**, 362-364 2012.
495. "Ionic liquids as oxidic media for electron transfer studies". Kazuhide Ueno and C. Austen Angell, *J. Chem. Phys.* **136**, 244501 (2012); doi: 10.1063/1.4729306
496. On the dynamics of supercooled liquids in their viscous regime" Z. Chen, C. A. Angell, R. Richert, *Eur. Phys. J. E* (2012) **35**: 65 (DOI 10.1140/epje/i2012-12065-2)
497. Lithium salt solutions in mixed sulfone, and sulfone-carbonate, solvents: a Walden plot analysis of the maximally conductive compositions. Seung-Yul Lee, Kazuhide Ueno, and C. Austen Angell. *J. Phys. Chem. C.* **116**, 23915-23920 (2012) dx.doi.org/10.1021/jp3067519
498. Anhydrous superprotic polymer by superacid protonation of PNC1₂. Younes Ansari, Kazuhide Ueno, Zuofeng Zhao, and C. Austen Angell (*J. Phys. Chem. C*, Volume: **117**,1548-1553 (2012) DOI: 10.1021/jp306302n
499. "Ideal glassformers" vs "ideal glasses": Crystal-free routes to the glass by "potential tuning" MD, and laboratory calorimetry, Vitaliy Kapko, Zuofeng Zhao, Dmitry V. Matyushov and C. Austen Angell, (invited for special issue on glass transition) *J. Chem. Phys.*, **138**, 12A549 (2013); doi: 10.1063/1.4794787
500. Fragile Glassformers: Evidence for a new paradigm and a new relation to strong liquids, C. A. Angell, in *Structural Glasses and Supercooled Liquids: Theory, Experiment, and Applications*, First Edition. Edited by Peter G. Wolynes and Vassilij Lubchenko. © 2012 John Wiley & Sons, Inc. Published 2012 by John Wiley & Sons, Inc.
501. . Glass Transitions and Critical Points in Orientationally Disordered Crystals and Structural Glassformers: ("Strong" Liquids are More Interesting Than We Thought), Text of Opening talk at the 2012 conference on Slow Dynamics, Sendai, December 2012, AIP Conf. Proc. **1518**, 9-17 2013, doi: 10.1063/1.4794546
502. A novel, easily synthesized, anhydrous derivative of phosphoric acid for use in electrolyte with phosphoric acid-based fuel cells. Younes Ansari, Telpriore Tucker, and C. Austen Angell, *J. Power Sources* (2013), pp. 47-51 DOI information: 10.1016/j.jpowsour.2013.03.003 <http://dx.doi.org/10.1016/j.jpowsour.2013.03.003>
503. Measurement of conductivity and permittivity on samples sealed in nuclear magnetic resonance tubes. W. Huang, C. A. Angell, J. L Yarger, and R. Richert, *Rev. Sci. Inst.* **8** (7), 073906 DOI: 10.1063/1.4816134 Published: JUL 2013
- 504 Energy Applications of Ionic Liquids Douglas R. MacFarlane¹, Naoki Tachikawa¹, Maria Forsyth², Jennifer M. Pringle², Patrick Howlett², Gloria D. Elliott³, James Davis⁴, Masahiro Watanabe⁵, Patrice Simon⁶ and C. Austen Angell⁷ *Energy Environ. Sci.*, **7**, 232–250 (2014) DOI: 10.1039/c3ee42099j
505. Fluctuations, clusters, and phase transitions in liquids, solutions, and glasses: from metastable water to phase change memory materials. C. Austen Angell and Zuofeng Zhao.. *Faraday Discuss.*, **167**, 625, 2013, (concluding lecture). DOI:10.1039/C3FD00111C.
506. The fragility of glassforming liquids: thermal vs athermal systems, and kinetic vs thermodynamic origins C. Austen Angell, in *Fragility of glass forming liquids* Editors: A. L. Greer, K. F. Kelton, S. Sastry Publisher: Hindustan Book Agency, New Delhi, India (700 pp). Chapter 1. 2014
507. Stacey Meadley and C. Austen Angell, Proceedings of the International School of Physics "Enrico Fermi" "WATER: FUNDAMENTALS AS THE BASIS FOR UNDERSTANDING THE ENVIRONMENT AND PROMOTING TECHNOLOGY "Course 187, edited by P. G. Debenedetti, M. A Ricci and F. Bruni (IOS Press, Amsterdam; SIF, Bologna) 2015, pp. 19-44 (previously arXiv 1404.4031
508. Enhanced Performance of sulfone, and sulfone-containing, solvents at lithium ion battery electrodes, including the LiNiMnO high voltage cathode. Leigang Xue, Kazuhide Ueno, S.-Y. Lee, C. Austen Angell, *J. Power Sources*, **262**, 123-128, 2014
509. Supercooled water: Two phases? *Nature Materials* (News and Views) **13** (June issue), 673-675 (2014)
510. Search for a liquid-liquid critical point in models of silica, Erik Lascaris, Mahin Hemmati, Sergey Bulderev, H. Eugene Stanley and C. Austen Angell, *J. Chem. Phys.* **140**, 224502 (2014); doi: 10.1063/1.4879057
511. Approaches to, and problems with, ionic liquid electrolytes for alkali metal electrochemical devices: The case of low-

- melting chloroaluminate binary solutions. T. G. Tucker and C. A. Angell, *J. Electrochem. Soc.* **161** (12) H796-H801 DOI 10.1149/2.0471412jes
512. Ionic Liquids, Superionic glasses, Quasi-Ionic Liquids, Quasi-Liquid Ionics, all with high Conductivities but some with Little Fluidity. Where does the Paradigm End? *Electrochem. Transactions ECS Trans.* 2014 64(4): 9-20; doi:10.1149/06404.0009e
513. On the uncertain distinction between fast landscape exploration and second amorphous phase (ideal glass) interpretations of the ultrastable glass phenomenon. C. Austen Angell, *J. Non-Crystalline Solids* 407 (2015) 246-255 DOI: 10.1016/j.jnoncrsol.2014.08.044
514. Forty years of silica simulations. Which way now? C. Austen Angell, *Intern. Journal of Appl. Glass Science*, Special issue, published on line (Early view) 6 FEB 2015. DOI: 10.1111/ijag.12112
- 515.. Ionic Liquid redox catholyte for high efficiency, low-cost energy storage. Leigang Xue, Telpriore G. Tucker, and C. Austen Angell* *Adv. Energy Mater.* **2015**, 1500271 doi.org/10.1002/aenm.201500271
516. Diffusivity and short-time dynamics in two models of silica Erik Lascaris, Mahin Hemmati, Sergey V. Buldyrev, H. Eugene Stanley, and C. Austen Angell, *J. Chem. Phys.* 142 (10), 104506 (2015)
517. [Physics of the Jagla Model as the Liquid-Liquid Coexistence Line Approaches Horizontal](#) J Luo, L Xu, CA Angell, HE Stanley, SV Buldyrev - *J. Chem. Phys.* 142 (22), 224501 (2015)
518. Sulfone-carbonate ternary electrolyte with further increased capacity retention and burn resistance for high voltage lithium ion batteries. L.-G. Xue, S. Y. Lee, Z.F. Zhao and C. A. Angell, *J. Power Sources*, 295, 190-196 (2015)
519. Phase change alloy viscosities down to T_g by Adam Gibbs equation fittings to excess entropy data: a fragile-to-strong transition. Shuai, Wei, Pierre Lucas, and C. Austen Angell, *J. Appl. Phys.* 118 (3), 034903 (2015)
520. A flexible inorganic fuel cell membrane with conductivity above Nafion, and durable fuel cell operation at 150°C. Y. Ansari, T. G. Tucker, W. Huang, I. S. Klein, S.-Y. Lee, J. L. Yarger and C. A. Angell* *J. Power Sources*, 303, 142-149 (2016) <http://dx.doi.org/10.1016/j.jpowsour.2015.10.034>
521. Apparent first order liquid-liquid transition, with pre-transition density anomaly, in water-rich ideal solutions. Z.-F. Zhao and C. A. Angell *Angew. Chem. Int. Ed.* 2016, 55, 1 – 5 International Edition: DOI: 10.1002/anie.201510717
522. NMR characterization of ionicity and transport properties for a series of diethylmethylamine based protic ionic liquids. Stephen K. Davidowski, Forrest Thompson, Wei Huang, Mohammad Hasani, Samrat A. Amin, C. Austen Angell, Jeffery L. Yarger* *J. Phys Chem.*, **B 120** (18), 4279-4285 (2016) DOI: 10.1021/acs.jpcc.6b01203
523. A liquid-liquid transition in supercooled aqueous solution related to the HADLDA phase transition in water Sander Woutersen, Bernd Ensing, Michiel Hilber, Zuofeng Zhao and C. Austen Angell, *Science* (March 9 2018) DOI: 10.1126/science.aao7049
524. Advanced High Voltage Aqueous Li-ion Battery Enabled by “Water-in-Bisalt” Electrolyte. Liumin Suo,^[a] Oleg Borodin,^[b] Wei Sun,^[a] Xiulin Fan,^[a] Fei Wang,^[a] Chongyin Yang,^[a] Tao Gao,^[a] Zhaohui Ma,^[a] Marshall Schroeder,^[b] Arthur von Wald Cresce,^[b] Selena M. Russell,^[b] Michel Armand,^[c] C. Austen Angell,^[d] Kang Xu ^{*[b]} and Chunsheng Wang ^{*[a]} *Angewandte Chemie Intern. Ed.* (in print) UPDATE FROM GOOGLE CIT
525. **Water: a Tale of Two Liquids**, P. Gallo, K. Amann-Winkel, C. A. Angell, M. Anisimov, F. Caupin, C. Chakravorty, T. Loerting, A. Panagiotopoulos, J. Russo, H. Stanley, H. Tanaka, C. Vega se los Heras, Xu Limei, and L. Pettersen. *Chemical Reviews* 116 (13), 7463-7500, 2017
526. Excess thermodynamic properties of glassforming liquids: the rational scaling of heat capacities, and the thermodynamic fragility dilemma resolved. Iolanda S. Klein, and C. Austen Angell, *J. Non-Cryst. Solids* 451, 116-123 (2016)
527. On the Use of a Protic Ionic Liquid with a Novel Cation to Study Anion Basicity. Mohammad Hasani,* Jeffery L. Yarger and C. Austen Angell, *Chem. Euro. J. Chemistry-A European Journal* 22 (37), 13312-13319 (2016)
528. Potential tuning in the S-W system. (i) Bringing $T_{c,2}$ to ambient pressure, and (ii) colliding $T_{c,2}$ with the liquid-vapor spinodal. C. Austen Angell* and Vitaliy Kapko. *J. Stat. Mech.* (special issue) *J. Stat. Mech.: Theory Exp.* **2016**, 094004.
529. Contrasting dynamics of fragile and non-fragile polyalcohols through the glass, and dynamical, transitions: a comparison of neutron scattering and dielectric relaxation data for sorbitol and glycerol, F. Migliardo^{1*}, C. A. Angell², S. Magazù³ = *Biochimica et Biophysica Acta (BBA)-General Subjects* 1861 (1), 3540-3545
530. Nanoporous, transparent MOF glasses with accessible internal surface. Yingbo Zhao, Seung-Yul Lee, Omar M. Yaghi* and C. Austen Angell*, *J. Am. Chem. Soc.*, 2016, 138 (34), pp 10818–10821 (Communication and spotlight)
531. Inorganic vs Organic Cation Ionic Liquids and Their Solutions with Alkali Metal Containing Ionic Liquids T. G. Tucker, S. K. Davidowski, and C. A. Angell, *J. Electrochem. Soc.* **164** (4) H153-H158 (2017)
532. Glass transitions, semiconductor-metal (SC-M) transitions and fragilities in Ge-V-Te (V=As, or Sb) liquid alloys: the difference one element can make. Shuai Wei, Garrett J. Coleman, Pierre Lucas, and C. Austen Angell* *Phys. Rev. Applied*, 7 (3), 034035 (2017)
533. Silicon hydrogen sulfates: Solid acids with exceptional conductivities and possible fuel cell applications. Iolanda S. Klein, Stephen K. Davidowski, Jeffery L. Yarger and C. Austen Angell. *J. Materials Chemistry A*, (2017) **5**, 14092-14100. DOI: 10.1039/C6TA10956J.

534. An inverse Aluminum battery. Putting the Aluminum in the cathode. Leigang Xu, Sen Xin, John B. Goodenough and C. Austen Angell. ACS Energy Letters. 2, 1534-1538 (2017)

535. Polymer electrolytes- some principles, cautions, and new practices. C. Austen Angell, Electrochimica Acta, Special issue from ISPE-15 250, 368-375 (2017)

536. A New Version of the Lithium Ion Conducting Plastic Crystal Solid Electrolyte. Iolanda S. Klein, Stephen K. Davidowski, Jeffery L. Yarger and C. Austen Angell. Adv. Energy Mater. **2018**, 1801324
DOI: 10.1002/aenm.201801324

537. A liquid-liquid transition in supercooled aqueous solution related to the HADLDA phase transition in water Sander Woutersen, Bernd Ensing, Michiel Hilber, Zuofeng Zhao and C. Austen Angell, Science (March 9 2018) DOI: 10.1126/science.aao7049

538. Breakdown of the Stokes-Einstein Relation Above the Melting Temperature in a Liquid Phase-Change Material, Shuai Wei, Zach Evenson, Moritz Stolpe, Pierre Lucas, C. Austen Angell, Science Advances, 2018;4: eaat8632 30 November 2018 online

Publicity:



1. Phys-Org <https://phys.org/news/2018-11-significantly-faster-memory-devices.html>
2. Physics World. (The writer omitted the credits that the original posting from ASU sources had been careful to properly represent. Phys-Org was more correct)

[Liquid phase-change material behaves like water](#)



539. Proton transfer and ionicity: an ¹⁵N NMR study of pyridine base protonation, Mohammad Hasani, Samrat A. Amin, Jeffery L. Yarger, Stephen K. Davidowski,* C. Austen Angell* J. Phys. Chem. (In press)

540. Postspace- a Personal Retrospective (Concluding remarks in the Encyclopedia of Glass, Ed. Pascal Richet (in press)

541. Concepts and conflicts in polymer electrolytes: the search for ion mobility, C. Austen Angell, Electrochimica Acta, (special issue) accepted and in press)

=====519.

BOOK REVIEWS

1. HIGH-WATER MARK FOR H₂O, Austen Angell. Physics World, 42-44, 2000 (Review of P. Ball, Life's Matrix,

2 The Glass Transition: Relaxation Dynamics in Liquids and Disordered Materials. E. Donth, Springer

PATENTS

A. ELECTROLYTES AND BATTERY COMPONENTS

1. "Lithium ion conducting electrolytes" C. A. Angell and C. Liu, US Patent No. 5,506,073, April 9, 1996.
2. "Lithium Ion Conducting Ionic Electrolytes" C. A. Angell, K. Xu, C. Liu, US Patent No. 5,484,670, Jan. 16, 1996.
3. "Alkali-Metal-Ion Conducting Electro-lytes" C. A. Angell, C. Liu, K. Xu, US Patent No. 5,786,110, July 28, 1998.
"Alkali-Metal-Ion Conducting Electro-lytes" C. A. Angell, C. Liu, K. Xu, US Patent No. 5,786,110, July 28, 1998.
4. "High Conductivity Electrolyte Solutions and Rechargeable Cells Incorporating Such Solutions" C. A. Angell, S. -S. Zhang and K. Xu, US Patent No. 5,824,433, Oct. 20, 1998.
5. "Wide Electrochemical Window Solvents for Use in Electrochemical Devices, and Electrolyte solutions Incorporating Such Solvents" C. A. Angell, K. Xu and S.-S. Zhang, US Patent No. 5,849,432, Dec. 15, 1998.
6. "Lithium Ion Conducting Electrolytes" C. A. Angell, C. Liu, K. Xu and T. Skotheim, US Patent No. 5,962,169, October 5, 1999.
7. "Electrochemically stable electrolytes" C. A. Angell, S.-S. Zhang, K. Xu, US Patent No. 5,855,809, Jan. 5, 1999.
8. "Lithium ion conducting electrolytes" C. A. Angell, C. Liu, K. Xu, and T. A. Skotheim, US Patent No. 5,962,169, 1999.
9. "Non-aqueous Electrolyte Solvents for Secondary Cells" C. A. Angell, K. Xu, I. P. Kovalev, T. A. Skotheim, US Patent No. 6,245,465 B1, Jun. 12, 2001. Int'l Publication No. WO 99/19932, April 1999 (pending).
10. "Solid Polymeric Electrolytes for Lithium Batteries Ionic Liquids and Ionic Liquid Acids with High Temperature Stability for Fuel Cell and Other High Temperature Applications, Method of" C.A. Angell US Patent No. 7,012,124 3/14/2006.
11. "Conductive polymeric compositions for lithium batteries" C. A. Angell and Wu Xu US Patent No 7,504,473 3/17/2009.
12. "Electrolytic Orthoborate Salts for Lithium Batteries" C.A. Angell and Wu Xu, US Patent No. 7,527,899 5/5/2009.
13. "Electric current producing device having Sulfone-Based Electrolyte C.A. Angell and Xiaoguang Sun US Patent No. 7,833,666 11/16/2010.
14. Neutral protic-salt electrolytes and protic-salt imbibed polymer membranes for high temperature fuel cell applications" C.A. Angell et al, US Patent No. 7,833,643 11/16/2010

15. . "Ionic liquids and ionic liquid acids with high temperature stability for fuel cell and other high temperature applications, method of making and cell employing same" C.A. Angell **Xu; Wu** (Broadview Heights, OH), **Belieres; Jean-Philippe** (Chandler, AZ), **Yoshizawa; Masahiro** (Tokyo, JP) **US Patent No. 7,867,658** 1/11/2011.
16. Inorganic salt mixtures as electrolyte media in fuel cells" CA Angell J.-P. Belieres & DF Gervasio, **US Patent No 8,273,477 B2** (Sep. 25, 2012),
17. [Phosphoric acid-based electrolytes and applications thereof](#)
CA Angell, Y Ansari, TG Tucker
US Patent 9,647,288 B2, DATE: May 9, 2017
- 18 . [IONIC LIQUID CATHOLYTES AND ELECTROCHEMICAL DEVICES CONTAINING SAME](#)
CA Angell, L Xue
US Patent (217)20, 170,309,943

PROVISIONAL PATENTS AND APPLICATIONS

19. Inorganic Plastic Crystal Electrolytes World Patent no: WO2014/028894 C. Austen Angell, Iolanda Santana Klein, Telpriore Greg Tucker [Inorganic plastic crystal electrolytes](#) CA Angell, IS Klein, TG Tucker
US Patent App. 14/775,215
20. Ionic Liquid Catholytes and Electrochemical Devices Containing Same. : C. Austen Angell, Telpriore Greg Tucker, Leigang Xue US Provisional Patent: 52/166,424
Date: 5/2015
21. [Electric current-producing device having sulfone-based electrolyte](#)
CA Angell, and X.-G, Sun
US Patent App. 12/897,602

Additional information

- (1) **Canadian Patent CA 2,236,934**, "Wide Electrochemical Window Solvent for Use in Electrochemical Devices and Electrolyte Solutions Incorporating Such Solvents", C. A. Angell, K. Xu and S. Zhang
- (2) **Australian Patent AU 1,084,599**, "Non-aqueous Electrolyte Solvents for Secondary Battery Cells", K. Xu, C. A. Angell, I. Kovalev and T. Skotheim
- (3) **Australian Patent AU 1,052,497**, "High Conductivity Electrolyte Solutions and Rechargeable Cells Incorporating Such Solutions", C. A. Angell, S. Zhang and K. Xu
- (4) **Australian Patent AU 7,719,896**, "Wide Electrochemical Window Solvent for Use in Electrochemical Devices and Electrolyte Solutions Incorporating Such Solvents", C. A. Angell, S. Zhang and K. Xu

B. GLASSES

1. "Methods of Making Nitride Glasses"
P. F. McMillan, C. A. Angell, T. Grande, J. R. Holloway,
U.S. Patent No. 5,455,211, Oct. 3, 1995.

C. OTHER

Complete Pub List 2 n