

# ROBERT S. EISENBERG

## PUBLICATIONS

[Reprints](#) available on this [hyperlink](#) or by clicking [[PDF](#)] here or below.

(Last update: September 6, 2012)

[[Laboratory of Robert S. Eisenberg](#)]

### *Papers: Electrical properties of tissues, mostly experimental:*

1. Eisenberg, R.S. and Hamilton, D. Action of  $\gamma$ -aminobutyric acid on *Cancer borealis* muscle. Nature 198: 1002-1003 (1963). [[PDF](#)]
2. Eisenberg, R.S. Impedance of single crab muscle fibers. Ph.D. Thesis, University of London (1965). [[PDF](#)]
3. Eisenberg, R.S. Equivalent circuit of single crab muscle fibers as determined by impedance measurement with intracellular electrodes. J. Gen. Physiol. 50: 1785-1806 (1967). [[PDF](#)]
4. Eisenberg, R.S. and Gage, P.W. Frog skeletal muscle fibers: change in the electrical properties of frog skeletal muscle fibers after disruption of the transverse tubular system. Science 158: 1700-1701 (1967). [[PDF](#)]
5. Gage, P.W. and Eisenberg, R.S. Action potentials without contraction in frog skeletal muscle fibers with disrupted transverse tubules. Science 158: 1702-1703 (1967). [[PDF](#)]
6. Horowicz, P., Gage, P.W. and Eisenberg, R.S. The role of the electrochemical gradient in determining potassium fluxes in frog striated muscle. J. Gen. Physiol. 51: 193s-203s (1968). [[PDF](#)]
7. Eisenberg, B. and Eisenberg, R.S. The transverse tubular system in glycerol treated muscle. Science 160: 1243-1244 (1968). [[PDF](#)]
8. Eisenberg, B. and Eisenberg, R.S. Selective disruption of the sarcotubular muscle: A quantitative study with exogenous peroxidase as a marker. J. Cell Biol. 39: 451-467 (1968). [[PDF](#)]
9. Gage, P.W. and Eisenberg, R.S. Capacitance of the surface and transverse tubular membrane of frog sartorius muscle fibers. J. Gen. Physiol. 53: 265-278 (1969). [[PDF](#)]
10. Eisenberg, R.S. and Gage, P.W. Ionic conductance of the surface and transverse tubular membrane of frog sartorius fibers. J. Gen. Physiol. 53: 279-297 (1969). [[PDF](#)]
11. Gage, P.W. and Eisenberg, R.S. Action potentials, after potentials, and excitation-contraction coupling in frog sartorius fibers without transverse tubules. J. Gen. Physiol. 53: 298-310 (1969). [[PDF](#)]
12. Eisenberg, R.S., Howell, J. and Vaughan, P. The maintenance of resting potentials in glycerol treated muscle fibers. J. Physiol. 215: 95-102 (1971). [[PDF](#)]

13. Vaughan, P., Howell, J. and Eisenberg, R.S. The capacitance of skeletal muscle fibers in solutions of low ionic strength. *J. Gen. Physiol.* 59: 347-359 (1972). [[PDF](#)]
14. Eisenberg, R.S., Vaughan, P. and Howell, J. A theoretical analysis of the capacitance of muscle fibers using a distributed model of the tubular system. *J. Gen. Physiol.* 59: 360-373 (1972). [[PDF](#)]
15. Leung, J. and Eisenberg, R.S. The effects of the antibiotics gramicidin-A, amphotericin-B, and nystatin on the electrical properties of frog skeletal muscle. *Biochem. Biophys. Acta. Amsterdam* 298: 718-723 (1973). [[PDF](#)]
16. Valdiosera, R., Clausen, C. and Eisenberg, R.S. Measurement of the impedance of frog skeletal muscle fibers. *Biophys. J.* 14: 295-315 (1974). [[PDF](#)]
17. Valdiosera, R., Clausen, C. and Eisenberg, R.S. Circuit models of the passive electrical properties of frog skeletal muscle fibers. *J. Gen. Physiol.* 63: 432-459 (1974). [[PDF](#)]
18. Valdiosera, R., Clausen, C. and Eisenberg, R.S. Impedance of frog skeletal muscle fibers in various solutions. *J. Gen. Physiol.* 63: 460-491 (1974). [[PDF](#)]
19. Mobley, B.A., Leung, J. and Eisenberg, R.S. Longitudinal impedance of skinned frog muscle fibers. *J. Gen. Physiol.* 63: 615-637 (1974). [[PDF](#)]
20. Mobley, B.A., Leung, J. and Eisenberg, R.S. Longitudinal impedance of single frog muscle fibers. *J. Gen. Physiol.* 65: 97-113 (1975). [[PDF](#)]
21. Eisenberg, R.S. and Rae, J.L. Current-voltage relationships in the crystalline lens. *J. Physiol.* 262: 285-300 (1976). [[PDF](#)]
22. Mathias, R.T., Eisenberg, R.S. and Valdiosera, R. Electrical properties of frog skeletal muscle fibers interpreted with a mesh model of the tubular system. *Biophys. J.* 17: 57-93 (1977). [[PDF](#)]
23. Eisenberg, R.S., Mathias, R.T. and Rae, J.L. Measurement, modeling and analysis of the linear electrical properties of cells. *Ann. N.Y. Acad. Sci.* 303: 343-354 (1977). [[PDF](#)]
24. Mathias, R.T., Rae, J.L. and Eisenberg, R.S. Electrical properties of structural components of the crystalline lens. *Biophys. J.* 25: 181-201 (1979). [[PDF](#)]
25. Rae, J.L., Eisenberg, R.S. and Mathias, R.T. The lens as a spherical syncytium. Ed. Satish K. Srivastava. Elsevier North Holland Inc. **Red Blood Cell and Lens Metabolism**. pp. 277-292 (1980). [[PDF](#)]
26. Mathias, R.T., Rae, J.L. and Eisenberg, R.S. The lens as a nonuniform spherical syncytium. *Biophys. J.* 34: 61-85 (1981). [[PDF](#)]
27. Eisenberg, B. and Eisenberg, R.S. The *T-SR* junction in contracting single skeletal muscle fibers. *J. Gen. Physiol.* 79: 1-20 (1982). [[PDF](#)]
28. Rae, J.L., Thomson, R.D. and Eisenberg, R.S. The effect of 2-4 dinitrophenol on cell to cell communication in the frog lens. *Exp. Eye Res.* 35: 597-610 (1982). [[PDF](#)]

29. Rae, J.L., Mathias, R.T. and Eisenberg, R.S. Physiological role of the membranes and extracellular space within the ocular lens. *Exp. Eye Res.* 35: 471-490 (1982). [[PDF](#)]
30. Eisenberg, R.S., McCarthy, R.T., and Milton, R.L. Paralysis of frog skeletal muscle fibres by the calcium antagonist D-600. *J. Physiol.* 341: 495-505 (1983). [[PDF](#)]
31. Levis, R.A., Mathias, R.T., and Eisenberg, R.S. Electrical properties of sheep Purkinje strands. Electrical and chemical potentials in the clefts. *Biophys. J.* 44: 225-248 (1983). [[PDF](#)]
32. Hui, C.S., Milton, R.L. and Eisenberg, R.S. Charge movement in skeletal muscle fibers paralyzed by the calcium entry blocker D600. *Proc. Natl. Acad. Sci.* 81: 2582-2585 (1984). [[PDF](#)]
33. Curtis, B.A. and Eisenberg, R.S. Calcium influx in contracting and paralyzed frog twitch muscle fibers. *J. Gen. Physiol.* 85: 383-408 (1985). [[PDF](#)]
34. Milton, R.L., Mathias, R.T., and Eisenberg, R.S. Electrical properties of the myotendon region of frog twitch muscle fibers measured in the frequency domain. *Biophys. J.* 48: 253-267 (1985). [[PDF](#)]
35. Eisenberg, R.S. Membranes, calcium, and coupling. *Can. J. Physiol. and Pharmacol.* 65: 686-690 (1987). [[PDF](#)]

***Papers: Theoretical Analysis and Modeling of Spread of Current:***

36. Eisenberg, R.S. and Johnson, E.A. Three dimensional electrical field problem in physiology. *Prog. Biophys. Mol. Biol.* 20: 1-65 (1970). [[PDF](#)]
37. Eisenberg, R.S. and Engel, E. The spatial variation of membrane potential near a small source of current in a spherical cell. *J. Gen. Physiol.* 55: 736-757 (1970). [[PDF](#)]
38. Barcilon, V., Cole, J. and Eisenberg, R.S. A singular perturbation analysis of induced electric fields in nerve cells. *SIAM J. Appl. Math.* 21: No. 2, 339-354 (1971). [[PDF](#)]
39. Eisenberg, R.S. and Costantin, L.L. The radial variation of potential in the transverse tubular system of skeletal muscle. *J. Gen. Physiol.* 58:700-701 (1971). [[PDF](#)]
40. Engel, E., Barcilon, V. and Eisenberg, R.S. The interpretation of current-voltage relationships from a spherical cell recorded with a single microelectrode. *Biophys. J.* 12: 384-403 (1972). [[PDF](#)]
41. Peskoff, A., Eisenberg, R.S. and Cole, J.D. Potential induced by a point source of current in the interior of a spherical cell. *UCLA Engineering Report #7259*, 62pp. (1972). [[PDF](#)]
42. Peskoff, A., Eisenberg, R.S. and Cole, J.D. Potential induced by a point source of current inside an infinite cylindrical cell. *UCLA Engineering Report #7303*, 70pp. (1973). [[PDF](#)]

43. Peskoff, A. and Eisenberg, R.S. Interpretation of some microelectrode measurements of electrical properties of cells. *Ann. Rev. Biophysics. and Bioeng.* 2: 65-79 (1973). [\[PDF\]](#)
44. Peskoff, A. and Eisenberg, R.S. A point source in a cylindrical cell: potential for a step-function of current inside an infinite cylindrical cell in a medium of finite conductivity. UCLA Engineering Report #7421, 73pp. (1974). [\[PDF\]](#)
45. Peskoff, A. and Eisenberg, R.S. The time-dependent potential in a spherical cell using matched asymptotic expansions. *Journal of Math. Biol.* 2: 277-300 (1975). [\[PDF\]](#)
46. Peskoff, A., Eisenberg, R.S. and Cole, J.D. Matched asymptotic expansions of the Green's function for the electric potential in an infinite cylindrical cell. *SIAM J. Appl. Math.* 30: 222-239, No. 2 (1976). [\[PDF\]](#)
47. Eisenberg, R.S., Barcilon, V., and Mathias, R.T. Electrical properties of spherical syncytia. *Biophys. J.* 25: 151-180 (1979). [\[PDF\]](#)
48. Mathias, R.T., Levis, R.A. and Eisenberg, R.S. Electrical models of excitation contraction coupling and charge movement in skeletal muscle. *J. Gen. Physiol.* 76: 1-31, (1980). [\[PDF\]](#)

***Papers: Electrical Properties of Ionic Channels:***

49. K.E. Cooper, Tang, J.M., Rae, J.L., and Eisenberg, R.S. A Cation Channel in Frog Lens Epithelia Responsive to pressure and Calcium. *J. Membrane Biology.* 93: 259-269 (1986). [\[PDF\]](#)
50. K.E. Cooper, P.Y. Gates, and Eisenberg, R.S. Surmounting barriers in ionic channels. *Quart. Rev. Biophysics.* 21: 331-364 (1988). [\[PDF\]](#)
51. K.E. Cooper, P.Y. Gates, and Eisenberg, R.S. Diffusion theory and discrete rate constants in ion permeation. *J. Membrane Biol.* 106: 95-105 (1988). [\[PDF\]](#)
52. J.M. Tang, J. Wang, and Eisenberg, R.S. K<sup>+</sup> selective channel from sarcoplasmic reticulum of split lobster muscle fibers. *J. Gen. Physiol.* 94:261-278 (1989). [\[PDF\]](#)
53. P.Y. Gates, K.E. Cooper, J. Rae, and Eisenberg, R.S. Predictions of diffusion models for one ion membrane channels. in *Progress in Biophysics and Molecular Biology.* 53: 153-196 (1989). [\[PDF\]](#)
54. P.Y. Gates, K.E. Cooper, and Eisenberg, R.S. Analytical diffusion models for membrane channels. in **Ion Channels, Volume 2** (editor. T. Narahashi), Plenum Press (1990). [\[PDF\]](#)
55. D. Junge and R.S. Eisenberg. Uniqueness and interconvertibility among membrane potassium channels. *Comments on Theoret. Biology.* 11: 45-55 (1990). [\[PDF\]](#)
56. Tang, J.M., Wang, J., F.N. Quandt, and R.S. Eisenberg. Perfusing pipettes. *Pflügers Arch.* 416:347-350 (1990). [\[PDF\]](#)

57. Chen, D.P., Barcilon, V., and R.S. Eisenberg. Constant fields and constant gradients in open ionic channels. *Biophysical J.* 61:1372-1393 (1992). [\[PDF\]](#)
58. Barcilon, V., D.P. Chen, and R.S. Eisenberg. Ion flow through narrow membrane channels. Part II. *SIAM Journal of Applied Mathematics* 52:1405-1425 (1992). [\[PDF\]](#)
59. Wang, J., Tang, J.M., and R.S. Eisenberg. A calcium conducting channel akin to a calcium pump. *J. Membrane Biology* 130:163-181 (1992). [\[PDF\]](#)
60. Barcilon, V., D.P. Chen, R. Eisenberg, and M. Ratner. Barrier crossing with concentration boundary conditions in biological channels and chemical reactions. *J. Chem. Phys.* 98(2) 1193-1211 (1993). [\[PDF\]](#)
61. Chen, D.P. and R.S. Eisenberg. Charges, currents, and potentials in ionic channels of one conformation. *Biophysical Journal.* 64:1405-1421 (1993a). [\[PDF\]](#)
62. Chen, D.P. and R.S. Eisenberg. Flux, coupling, and selectivity in ionic channels of one conformation. *Biophysical Journal* 65:727-746 (1993b). [\[PDF\]](#)
63. Hainsworth, A.H., Levis, R.A., and R.S. Eisenberg. Origins of open-channel noise in the large potassium channel of sarcoplasmic reticulum. *J. Gen. Physiol.* 104:857-884 (1994). [\[PDF\]](#)
64. Eisenberg, R.S., Kłosek, M.M., and Schuss, Z. Diffusion as a chemical reaction: stochastic trajectories between fixed concentrations. *J. Chem. Phys.*, 102(4): 1767-1780 (1995). [\[PDF\]](#) and Revised Version [\[PDF\]](#)
65. Elber, R., Chen, D., Rojewska, D., and Eisenberg, R.S. Sodium in gramicidin: an example of a permion. *Biophysical Journal*, 68: 906-924, (1995). [\[PDF\]](#)
66. Chen, D., Eisenberg, R., Jerome, J., and Shu, C. Hydrodynamic model of temperature change in open ionic channels. *Biophysical J.* 69: 2304-2322. (1995). [\[PDF\]](#)
67. Barkai, E., Eisenberg, R.S., and Schuss, Z. (1996). A bidirectional shot noise in a singly occupied channel. (*Physical Review E*(2), 54 1161-1175). [\[PDF\]](#)
68. Chen, D., Lear, J., and Eisenberg, Bob. (1997) Permeation through an Open channel. Poisson-Nernst-Planck Theory of a Synthetic Ionic Channel. (*Biophysical Journal*, 72 97-116). [\[PDF\]](#)
69. Barcilon, V., Chen, D.-P., Eisenberg, R.S., and J.W. Jerome. (1997) Qualitative properties of steady-state Poisson-Nernst-Planck systems: perturbation and simulation study. *SIAM J. Appl. Math.* 57(3) 631-648. [\[PDF\]](#)
70. Chen, D.; Xu, L.; Tripathy, A.; Meissner, G.; Eisenberg, B. (1997) Permeation through the Calcium Release Channel of Cardiac Muscle. *with an appendix Rate Constants in Channology.* *Biophys. J.* 73(3) 1337-1354. [\[PDF\]](#)
71. Nonner, W.; Chen, D.; Eisenberg, B. (1998) Anomalous Mole Fraction Effect, Electrostatics, and Binding. *Biophys. J.* 74 2327-2334. [\[PDF\]](#)
72. Nonner, W. and Eisenberg, B. (1998) Ion Permeation and Glutamate Residues Linked by Poisson-Nernst-Planck Theory in L-type Calcium Channels. *Biophys. J.* 75:1287-1305. [\[PDF\]](#)

73. Chen, D.; Xu, L.; Tripathy, A.; Meissner, G.; and Eisenberg, B. (1999) Selectivity and Permeation in Calcium Release Channel of Cardiac Muscle: Alkali Metal Ions. *Biophysical Journal* 76:1346-1366. [[PDF](#)]
74. Hollerbach, U., Chen, D.P., Busath, D. D., and Eisenberg, B. (2000) Predicting function from structure using the Poisson-Nernst-Planck equations: sodium current in the gramicidin A channel. *Langmuir* 16:5509-5514. [[PDF](#)]
75. Gardner, C., Jerome, J. and R.S. Eisenberg (2000) Electrodiffusion Model of Rectangular Current Pulses in Ionic Channels of Cellular Membranes. *SIAM J Applied Math* 61 792-802. [[PDF](#)]
76. Nonner, W., L. Catacuzzeno, and Eisenberg, B. (2000). Binding and Selectivity in L-type Ca Channels: a Mean Spherical Approximation. *Biophysical Journal* 79: 1976-1992. [[PDF](#)]
77. Hollerbach, U., Chen, D.P., and Eisenberg, B. (2001) Two and Three Dimensional Poisson-Nernst-Planck Simulations of Current Through Gramicidin-A. *J. Scientific Computing* 16 (4) 373-409. [[PDF](#)]
78. Gillespie, D. and Eisenberg, R.S. (2001) Modified Donnan potentials for ion transport through biological ion channels. *Phys Rev E*, 63 061902 1-8. [[PDF](#)]
79. Nonner, W., Gillespie, D., Henderson, D., and Eisenberg, Bob. (2001) Ion accumulation in a biological calcium channel: effects of solvent and confining pressure. *J Physical Chemistry B* 105: 6427-6436. [[PDF](#)]
80. Schuss, Zeev, Nadler, Boaz, and Eisenberg, R.S. (2001) Derivation of PNP Equations in Bath and Channel from a Molecular Model, *Phys Rev E* 64: 036116 1-14. [[PDF](#)]
81. Hess, K., Ravaoli, U., Gupta, M., Aluru, N., van der Straaten, T., and R.S. Eisenberg (2001) Simulation of Biological Ionic Channels by Technology Computer-Aided Design. *VLSI Design* 13: pp.179-187. [[PDF](#)]
82. Gillespie, Dirk, Nonner, W., Henderson, Douglas and Eisenberg, Robert S. (2002) A physical mechanism for large-ion selectivity of ion channels. *Physical Chemistry Chemical Physics*. 4, 4763-4769. [[PDF](#)]
83. Gillespie, Dirk, and Eisenberg, Robert S. (2002). Physical descriptions of experimental selectivity measurements in ion channels. *European Biophysics Journal* 31: 454-466). [[PDF](#)]
84. Gillespie, Dirk, Nonner, W., and Eisenberg, Robert S. (2002) Coupling Poisson-Nernst-Planck and Density Functional Theory to Calculate Ion Flux. *Journal of Physics (Condensed Matter)* 14: 12129–12145. [[PDF](#)]
85. Gardner, Carl L., Jerome, Joseph W., and Eisenberg. R.S. (2002) Electrodiffusion Model Simulation of Rectangular Current Pulses in a Voltage Biased Biological Channel. *Journal of Theoretical Biology* 219 291-299. [[PDF](#)]
86. Gardner, Carl L., Jerome, Joseph W., and Eisenberg. R.S. (2002) Electrodiffusion Model Simulation of Rectangular Current Pulses in a Biological Channel. *J Computational Electronics*, 1 347-351. [[PDF](#)]

87. van der Straaten, T.A., Tang, J., Eisenberg, R.S., Ravaioli, U., and Aluru, N.R. (2002) Three-dimensional continuum simulations of ion transport through biological ion channels: effects of charge distribution in the constriction region of porin. *J. Computational Electronics* 1 335-340 [\[PDF\]](#)
88. Boda, D., Busath, D., Eisenberg, B., Henderson, D., and Nonner, W. (2002) Monte Carlo Simulations of ion selectivity in a biological Na channel: charge-space competition. *Physical Chemistry Chemical Physics* 4 5154-5160. [\[PDF\]](#)
89. Hollerbach, Uwe and Robert Eisenberg. (2002) Concentration-Dependent Shielding of Electrostatic Potentials Inside the Gramicidin A Channel. *Langmuir* 18 3262-3631. [\[PDF\]](#)
90. Gillespie, D., Nonner, W. and RS Eisenberg. (2003) Crowded Charge in Biological Ion Channels *Nanotech* 3: 435-438. [\[PDF\]](#)
91. Nadler, B., Schuss, Z., Singer, A., Eisenberg, B. (2003) Diffusion through protein channels: from molecular description to continuum equations. *Nanotech* 3: 439-442. [\[PDF\]](#)
92. Wigger-Aboud, S., Saraniti, M. and R. Eisenberg. (2003) Self-consistent particle based simulations of three dimensional ionic solutions. *Nanotech* 3: 443-446. [\[PDF\]](#)
93. Aboud, S., Saraniti, M. and R. Eisenberg. (2003) Computational issues in modeling ion transport in biological channels: Self-consistent particle-based simulations. *Journal of Computational Electronics* 2: 239-243. [\[PDF\]](#)
94. van der Straaten, T., Kathawala, G., Kuang, Z., Boda, D., Chen, D.P., Ravaioli, U., Eisenberg, R.S., and Henderson, D. (2003) Equilibrium structure of electrolyte calculated using equilibrium Monte Carlo, Molecular Dynamics, and Transport Monte Carlo simulation. *Nanotech* 3: 447-451. [\[PDF\]](#)
95. Chen, D.; Xu, L.; Eisenberg, B; and Meissner, G. (2003) Calcium Ion Permeation through the Calcium Release Channel (Ryanodine Receptor) of Cardiac Muscle. *J Phys Chem* 107 9139-9145. [\[PDF\]](#)
96. Nadler, Boaz, Hollerbach, Uwe, Eisenberg, Bob. (2003) The Dielectric Boundary Force and its Crucial Role in Gramicidin. *Phys. Rev. E* 68 021905 p1-9. [\[PDF\]](#)
97. Gillespie, Dirk, Nonner, Wolfgang, and Eisenberg, Robert S. (2003) Density functional theory of charged, hard-sphere fluids. *Phys Rev E* 68 0313503 1-10. [\[PDF\]](#)
98. van der Straaten, T. A., Tang, J. M., Ravaioli, U., Eisenberg, R. S. and Aluru, N. (2003) Simulating Ion Permeation Through the OmpF Porin Ion channel Using Three-Dimensional Drift-Diffusion Theory. *Journal of Computational Electronics* 2: 29-47. [\[PDF\]](#)
99. Boda, Dezso, Varga, Tibor, Henderson, Douglas, Busath, David, Nonner, Wolfgang, Gillespie, Dirk, and Bob Eisenberg. (2004) Monte Carlo simulation study of a system with a dielectric boundary: application to calcium channel selectivity. *Molecular Simulation* 30: 89-96. [\[PDF\]](#)

100. Gardner, Carl, Nonner, Wolfgang, and Eisenberg, Robert S. (2004) Electrodiffusion Model Simulation of Ionic Channels: 1D Simulations *Journal of Computational Electronics* 3: 25–31. [[PDF](#)]
101. Boda, Dezso, Gillespie, Dirk, Nonner, Wolfgang, Henderson, Douglas and Bob Eisenberg. (2004) Computing induced charges in inhomogeneous dielectric media: application in a Monte Carlo simulation of complex ionic systems *Phys Rev E* 69, 046702. [[PDF](#)]
102. Goryll, M., Wilk, S., Laws, G. M., Thornton, T. J., Goodnick, S. M., Saraniti, M., Tang, J. M. and R. S. Eisenberg (2003) Silicon-based ion channel sensor *Superlattices & Microstructures* 34(3-6), 451-457. [[PDF](#)]
103. Goryll, M., Wilk, S., Laws, G.M., Thornton, T. J., Goodnick, S. M., Saraniti, M., Tang, J. M. and R. S. Eisenberg (2004) Ion Channel Sensor on a Silicon Support *Mat. Res. Soc. Symp. Proc. Vol. 820, O7.2.1-5*. Proceedings Title: Nanoengineered Assemblies and Advanced Micro/Nanosystems Editors (Symposium O): Jun Liu, Jeffrey T. Borenstein, Piotr Grodzinski, Luke P. Lee, Zhong Lin Wang. [[PDF](#)]
104. Nadler, Boaz, Schuss, Zeev, Singer, Amit, and R.S Eisenberg. (2004) Ionic diffusion through confined geometries: from Langevin equations to partial differential equations. *J. Physics: Condensed Matter* 16: S2153-S2165. [[PDF](#)]
105. Schuss, Zeev, B. Nadler, A. Singer, and R.S. Eisenberg, Models of boundary behavior of particles diffusing between two concentrations *in Fluctuations and Noise in Biological, Biophysical, and Biomedical Systems II* editors: D. Abbot, S. M. Bezrukov, A. Der, A. Sanchez, 26-28 May 2004 Maspalomas, Gran Canaria, Spain, *Spie proceedings series Volume 5467*, pp. 345-358. [[PDF](#)]
106. Miedema, Henk, Anita Meter-Arkema, Jenny Wierenga, John Tang, Bob Eisenberg, Wolfgang Nonner, Hans Hektor, Dirk Gillespie and Wim Meijberg (2004) Permeation properties of an engineered bacterial OmpF porin containing the EEEE-locus of Ca<sup>2+</sup> channels. *Biophysical Journal* Volume 87 3137–3147. [[PDF](#)]
107. Aboud, S., Marreiro, D., Saraniti, M., and R. Eisenberg. (2004) A Poisson P3M Force Field Scheme for Particle-Based Simulations of Ionic Liquids. *J. Computational Electronics*, 3: 117–133. [[PDF](#)]
108. Wilk, Seth, Goryll, Michael, Laws, Gerard M., Goodnick, Stephen M., Thornton, Trevor J., Saraniti, Marco, Tang, John M. and Eisenberg, Robert S. (2004) Teflon coated silicon aperture for lipid bilayer attachment. *Applied Physics Letters*, 85, 3307-3309 [[PDF](#)]
109. Nadler, Boaz, Schuss, Zeev, Hollerbach, Uwe, R.S. Eisenberg. (2004) Saturation of conductance in single ion channels: the blocking effect of the near reaction field. *Phys Rev E* 70, 051912. [[PDF](#)]
110. Nonner, Wolfgang, Peyser, Alexander, Gillespie, Dirk, and Bob Eisenberg. (2004) Relating microscopic charge movement to macroscopic currents: the Ramo-Shockley theorem applied to ion channels. *Biophysical Journal*, 87: 3716-22. [[PDF](#)]



111. Singer, A., Schuss, Z., Nadler, B., and R.S. Eisenberg (2004) Memoryless control of boundary concentrations of diffusing particles *Phys Rev E* 70, 061106. [[PDF](#)]
112. van der Straaten, Trudy A., Kathawala, G. Trellakis, A., Eisenberg, R.S., Ravaioli, U. (2005) BioMOCA — a Boltzmann transport Monte Carlo model for ion channel simulation. *Molecular Simulation*, 31: 151-171. [[PDF](#)]
113. Aguilera-Arzo, Marcel, Aguilera, Vicente and R. S. Eisenberg (2005) Computing numerically the access resistance of a pore *European Biophysics Journal*, 34: 314-322. [[PDF](#)]
114. Aboud, Shela, Marreiro, David, Saraniti, Marco, and Robert Eisenberg. (2005) The Role of Long-Range Forces in Porin Channel Conduction. *Journal of Computational Electronics* 4: 175–178. [[PDF](#)]
115. Marreiro, David, Aboud, Shela, Saraniti, Marco, and Robert Eisenberg.(2005) Error Analysis of the Poisson P3MForce Field Scheme for Particle-Based Simulations of Biological Systems *Journal of Computational Electronics* 4: 179–183. [[PDF](#)]
116. Singer, Amit, Schuss, Zeev, and R. S. Eisenberg. (2005) Attenuation of the electric potential and field in disordered systems *J. Stat. Phys.* 119 (5/6) 1397-1418. [[PDF](#)] Posted on arXiv.org with Paper ID [arXiv:0501048](#)
117. Boda, D., Gillespie, D., Eisenberg, B., Nonner, W., Henderson, D. (2005) Induced Charge Computation Method: Application in Monte Carlo simulations of inhomogeneous dielectric systems p. 19–43. *in* D. Henderson et al. (eds.), *Ionic Soft Matter: Modern Trends in Theory and Applications*, Springer NY. [[PDF](#)]
118. Singer, Amit, Schuss, Zeev, Holcman, David and R. S. Eisenberg. (2006) Narrow Escape. Part I, *J. Stat. Phys.* 122, 437-463. [[PDF](#)] Posted on arXiv.org with Paper ID [arXiv:0412048](#)
119. Siwy, Zuzanna, Powell, Matthew R., Kalman, Eric, Astumian, R. Dean, Eisenberg, Robert S. (2006) Negative Incremental Resistance Induced by Calcium in Asymmetric Nanopores. *Nano Letters* 6, 473-477. [[PDF](#)]
120. Miedema, Henk, Vrouenraets, Maarten, Wierenga, Jenny, Eisenberg, Bob, Schirmer, Tilman, Baslé, Arnaud and Wim Meijberg. (2006) Conductance and selectivity fluctuations in D127 mutants of the bacterial porin OmpF. *European Journal of Biophysics*, 36 13-22. [[PDF](#)]
121. Siwy, Zuzanna, Powell, Matthew R., Petrov, Alexander, Kalman, Eric, Trautmann, Christina, and Eisenberg, Robert S. (2006) Calcium-Induced Voltage Gating in Single Conical Nanopores. *Nano Letters* 6, 1729 -1734. [[PDF](#)]
122. Boda, Dezső, Valisko, Monika, Eisenberg, Bob, Nonner, Wolfgang, Henderson, Douglas, and Dirk Gillespie (2006) The Effect of Protein Dielectric Coefficient on the Ionic Selectivity of a Calcium Channel. *Journal of Chemical Physics* 125, 034901 1-11. [[PDF](#)]

123. Miedema, Henk, Vrouwenraets, Maarten, Wierenga, Jenny, Gillespie, Dirk, Eisenberg, Bob, Meijberg, Wim and Wolfgang Nonner. (2006)  $\text{Ca}^{2+}$  selectivity of a chemically modified OmpF with reduced pore volume. *Biophysical J.* 91 4392-4400. [[PDF](#)]
124. Eisenberg, Bob, Nonner, Wolfgang (2007) Shockley-Ramo Theorem Measures Conformation Changes of Ion Channels and Proteins. *J Computational Electronics* 6:363-345. [[PDF](#)]
125. Eisenberg, Bob, Liu, Weishi (2007) Poisson-Nernst-Planck systems for ion channels with permanent charges. *SIAM Journal on Mathematical Analysis* 38, No. 6, pp. 1932–1966. [[PDF](#)]
126. Burger, Martin, Eisenberg, Robert S. and Heinz Engl (2007) Inverse Problems Related to Ion Channel Selectivity. *SIAM J Applied Math* Vol. 67, No. 4, pp. 960–989. [[PDF](#)]
127. Boda, Dezso, Valisko, Monika, Eisenberg, Bob, Nonner, Wolfgang, Henderson, Douglas, and Dirk Gillespie (2007). The combined effect of pore radius and protein dielectric coefficient on the selectivity of a calcium channel. *Phys Rev. Letters* 98 168102 p.1-4 [[PDF](#)]
128. Boda, Dezsó, Nonner, Wolfgang, Valisko, Mónika, Henderson, Douglas, Eisenberg, Bob, and Dirk Gillespie (2007) Steric Selectivity in Na Channels Arising from Protein Polarization and Mobile Side Chains. *Biophysical Journal* 93:1960-1980. [[PDF](#)]
129. Wilk, S.J., Petrossian, L., Goryll M., Thornton, T.J., Goodnick, S.M., Tang, J.M., Eisenberg R.S. (2007) Integrated Electrodes on a Silicon Based Ion Channel Measurement Biosensors and Bioelectronics [Volume 23, Issue 2](#), 30 September 2007, Pages 183-190. [doi:10.1016/j.bios.2007.03.030](https://doi.org/10.1016/j.bios.2007.03.030) [[PDF](#)]
130. Miedema, Henk Vrouwenraets, Maarten Wierenga, Jenny Meijberg, Wim, Robillard, George and Bob Eisenberg (2007) A biological porin engineered into a molecular, nanofluidic diode. *Nanoletters* 7: 2886-2891. [[PDF](#)]
131. Boda, Dezsó, Nonner, Wolfgang, Henderson, Douglas, Eisenberg, Bob, and Dirk Gillespie. (2008) Volume exclusion in calcium selective channels. *Biophys. J.*, 94: 3486–3496 *BioFAST*: January 16, 2008. [doi:10.1529/biophysj.107.122796](https://doi.org/10.1529/biophysj.107.122796). [[PDF](#)]
132. Roth, Roland, Gillespie, Dirk, Nonner, Wolfgang, Eisenberg, Bob. (2008) Bubbles, gating and anesthetics in ion channels. *Biophysical Journal* Volume 94 4282–4298 published online as January 30, 2008 as *BioFAST*, [doi:10.1529/biophysj.107.120493](https://doi.org/10.1529/biophysj.107.120493) [[PDF](#)] *note misprint in middle initial of RSE in print edition.*
133. Powell, Matthew; Sullivan, Michael; Vlassioux, Ivan; Constantin, Dragos; Sudre, Olivier; Martens, Craig, Eisenberg, Robert; and Siwy, Zuzanna (2008) Nanoprecipitation Assisted Ion Current Oscillations. *Nature Nanotechnology* 3, 51 - 57 (01 Jan 2008), [doi: 10.1038/nnano.2007.420](https://doi.org/10.1038/nnano.2007.420). [[PDF](#)]
134. Eisenberg, Bob. (2008). Bubble Gating Currents in Ionic Channels. Posted on arXiv.org with Paper ID [arXiv:0802.0308v1](https://arxiv.org/abs/0802.0308v1). [[PDF](#)]

135. Singer, A. Gillespie, D., Norbury J., and Eisenberg, R.S. (2008) Singular perturbation analysis of the steady state Poisson-Nernst-Planck system: applications to ion channels. *European Journal of Applied Mathematics* vol. 19, pp. 541–560. [[PDF](#)]
136. Abaid, Nicole, Eisenberg, R.S., Liu, Weishi. (2008) Asymptotic expansions of I-V relations via a Poisson-Nernst-Planck system. *SIAM Journal of Applied Dynamical Systems*. 7 1507-1526. [[PDF](#)]
137. Boda, Dezső, Valisko, Monika, Henderson, Douglas, Eisenberg, Robert, Gilson, Michael. (2009) Ions and Inhibitors in the Binding Site of HIV-Protease: Comparison of Monte Carlo Simulations and the Linearized Poisson-Boltzmann Theory. *Biophysical Journal* 96 1293–1306. [[PDF](#)]
138. Boda, Dezső, Valisko, Monika, Henderson, Douglas, Eisenberg, Bob, Gillespie, Dirk, and Wolfgang Nonner. (2009) Ionic selectivity in L-type calcium channels by electrostatics and hard-core repulsion. Cover of *Journal of General Physiology* [[COVER](#)] and 133 p. 497-509. [[PDF](#)]
139. He, Yan, Gillespie, Dirk, Boda, Dezső, Vlassiuk Ivan, Eisenberg, Robert S., and Zuzanna S. Siwy. (2009) Tuning transport properties of nanofluidic diodes with local charge inversion *Journal of the American Chemical Society* 131 (14), pp 5194–5202. [[PDF](#)]
140. Bardhan, Jaydeep P., Eisenberg, Robert S., and Dirk Gillespie. (2009) Discretization of the Induced-Charge Boundary Integral Equation. *Physical Review E*. 80, 011906. [[PDF](#)]
141. Luchinsky, D. G., Tindjong, R., Kaufman, I., McClintock, P.V.E., and R.S. Eisenberg. (2009) Self-consistent analytic solution for the current and the access resistance in open ion channels. *Physical Review E* 80, 021925. [[PDF](#)]
142. Malasics, Attila, Gillespie, Dirk, Nonner, Wolfgang, Henderson, Douglas, Eisenberg, Bob, Boda, Dezső. (2009) Protein structure and ionic selectivity in calcium channels: Selectivity filter size, not shape, matters. *Biophysica and Biochimica Acta: Biomembranes Biochimica et Biophysica Acta* 1788, 2471–2480. [[PDF](#)]
143. Luchinsky, D. G., Tindjong, R., Kaufman, I., McClintock, P.V.E., and R.S. Eisenberg. (2009) Charge fluctuations and their effect on conduction in biological ion channels. *Journal of Statistical Mechanics: Theory and Experiment*. P01010. [doi:10.1088/1742-5468/2009/01/P01010](https://doi.org/10.1088/1742-5468/2009/01/P01010). [[PDF](#)]
144. Knepley, Matthew G., Karpeev, Dmitry A., Davidovits, Seth, Eisenberg, Robert S., and Dirk Gillespie. (2010) An efficient algorithm for classical density functional theory in three dimensions. *Journal of Chemical Physics* 132, 124101-1 to 124101-11. [[PDF](#)] Posted on arXiv.org with Paper ID [arXiv:0910.1531](https://arxiv.org/abs/0910.1531).
145. Zhang, Chao; Raugei, Simone, Eisenberg, Robert, and Paolo Carloni. (2010) Molecular Dynamics in Physiological Solutions: Force-fields, Alkali Metal Ions, and Ionic Strength. *Journal of Chemical Theory and Computation*. 6:2167-2175. [[PDF](#)]
146. Eisenberg, Bob, Hyon, YunKyong, and Chun Liu. (2010) Energy Variational Analysis EnVarA of Ions in Water and Channels: Field Theory for Primitive Models of Complex Ionic Fluids. *Journal of Chemical Physics*. 133, 104104 (23 pages) [[PDF](#)]

147. Hyon, YunKyong, Eisenberg, Bob and Chun Liu. (2010). A mathematical model of the hard sphere repulsion in ionic solutions. *Communications in Mathematical Sciences* **9**, pp. 459–475 [[PDF](#)]
148. Eisenberg, B., Multiple Scales in the Simulation of Ion Channels and Proteins. (2010) *The Journal of Physical Chemistry C*, 2010. **114** (48): p. 20719-20733. [[PDF](#)]
149. Giri, Janhavi, Fonseca, James. E., Boda, Dezső, Henderson, Douglas, and Eisenberg, Bob. (2011) Self-organized Models of Selectivity in Calcium Channels. *Physical Biology Phys. Biol.* **8** 026004 [[PDF](#)]
150. Boda, Dezső, Giri, Janhavi, Henderson, Douglas Eisenberg, Robert and Gillespie, Dirk. (2011) Analyzing the components of the free energy landscape in a calcium selective ion channel by Widom's particle insertion method. *Journal of Chemical Physics.* **134**, 055102 [[PDF](#)]
151. Krauss, Daniel, Eisenberg, Bob and Gillespie, Dirk. (2011) Selectivity sequences in a model calcium channel: Role of electrostatic field strength. *European Journal of Biophysics*, **40**(6): p. 775-782. [[PDF](#)]
152. Boda, Dezső, Henderson, Douglas, Eisenberg, Bob and Dirk Gillespie. (2011) A method for treating the passage of a charged hard sphere ion as it passes through a sharp dielectric boundary. *Journal of Chemical Physics*, 135(6): 64105. [[PDF](#)]
153. Mori, Yoichiro, Liu, Chun, and RS Eisenberg. (2011) A model of electrodiffusion and osmotic water flow and its energetic structure. *Physica D: Nonlinear Phenomena* 240(22): 1835-1852. [[PDF](#)] See early version in the 'Everything Else' section of this Publication List, item 34. Mori, *et al.*
154. Hyon, YunKyong, Fonseca, James E., Eisenberg, Bob, and Chun Liu. (2012) Energy variational approach to study charge inversion (layering) near charged walls. *Discrete and Continuous Dynamical Systems - Series B (DCDS-B)* 17(8) 2725-2743. [[PDF](#)]
155. Berti, Claudio, Gillespie, Dirk, Eisenberg, Robert S. and Claudio Fiegna Particle-based simulation of charge transport in discrete-charge nano-scale systems: the electrostatic problem. *Nanoscale Research Letters INEC 2011 Special Issue (in the press)*. [[PDF](#)]
156. Ryham, Rolf, Cohen, Frederic S. and Robert Eisenberg. (2012) a Dynamic Model of Open Vesicles in Fluids. *Communications in Mathematical Sciences.* 10: No. 4, pp. 1273–1285. [[PDF](#)]
157. Giri, Janhavi, Tang, John M., Wirth, Christophe, Peneff, Caroline M. and Bob Eisenberg. (2012) Single Channel Measurements of N-Acetylneuraminic Acid-Inducible Outer Membrane Channel in *Escherichia coli*. *European Biophysics Journal* on-line as DOI 10.1007/s00249-011-0781-5 [[PDF](#)]

158. Jimenez-Morales, David, Liang, Jie and Bob Eisenberg. (2012) Ionizable Side Chains at Catalytic Active Sites of Enzymes *European Biophysics Journal* 41 (5):449-460. doi:10.1007/s00249-012-0798-4 [PDF]
159. Tindjong, R., Kaufman, I., Mcclintock, P.V.E., Luchinsky, D.G. and R.S. Eisenberg. (2012) Nonequilibrium rate theory for conduction in open ion channels. *Fluctuation and Noise Letters*. 11, No. 1 00083 (10 pages). DOI: 10.1142/S0219477512000837. [PDF]
160. Berti, Claudio, Gillespie, Dirk, Bardhan, Jaydeep, Eisenberg, Robert S., and Claudio Fiegna. (2012) Comparison of three-dimensional Poisson solution methods for particle-based simulation and inhomogeneous dielectrics *Physical Review E* 86(1): 011912 [PDF]
161. Horng, Tzyy-Leng, Lin, Tai-Chia, Liu, Chun and Bob Eisenberg. (2012) PNP Equations with Steric Effects: A Model of Ion Flow through Channels. *Journal of Physical Chemistry B* (*in the press*: <http://dx.doi.org/10.1021/jp305273n>).

***Reviews, mostly invited:***

1. † Eisenberg, R.S. The equivalent circuit of frog skeletal muscle. (1971) In: *Contractility of Muscle Cells* (Ed. R. Podolsky) Prentice Hall, p. 73-88. [PDF]
2. † Eisenberg, R.S. and Mathias, R.T. (1980) Structural analysis of electrical properties. *Critical Reviews in Bioengineering* 4: 203-232. [PDF]
3. Eisenberg, R.S. Structural Complexity, Circuit Models, and Ion Accumulation. (1980) *Fed. Proc.* 39: 1540-1543. [PDF]
4. Mathias, R.T., R.A. Levis, and R.S. Eisenberg. (1981) An alternative interpretation of charge movement in muscle. In: **The Regulation of Muscle Contraction: Excitation-Contraction Coupling**. Ed. A. D. Grinnell & M.A.B. Brazier, Academic Press, New York, pp 39-52. [PDF]
5. Eisenberg, R.S. (1983) Impedance Measurement of the Electrical Structure of Skeletal Muscle. In: **Handbook of Physiology, Section 10: Skeletal Muscle**, Ed. L.D. Peachey American Physiological Society, pp 301-323. [PDF]
6. † Eisenberg, R.S. (1984) Membranes and Channels. *Physiology and Molecular Biology*, pp. 235-283. In: **Membranes, Channels, and Noise**, Eds. R.S. Eisenberg, M. Frank, and C.F. Stevens, Plenum Press, NY. [PDF]
7. Eisenberg, R.S. (1986) Electrical field problems in muscle and their meaning to mathematicians, physiologists, and muscle. *in: Some Mathematical Questions in Biology - Muscle Physiology. Lectures on Mathematics in the Life Sciences, Vol. 16*. Ed., Robert M. Miura, American Mathematical Society, Providence, Rhode Island, 16: 223-234. [PDF]
8. † Eisenberg, R.S. (1987) Impedance measurements as estimators of the properties of the extracellular space. *Ann. NY Acad. Sci.* 481: 116-122. [PDF]

9. † Rae, J.L., Levis, R.A., and Eisenberg, R.S. (1988) Ionic channels in ocular epithelia. Ch. 8, p. 283-327 in **Ion Channels** (ed. T. Narahashi), Plenum Press. [[PDF](#)]
10. † Eisenberg, R.S. Channels as Enzymes. *J. Membrane Biology* 115, 1-12 (1990) [[PDF](#)]. Also available on arXiv as <http://arxiv.org/pdf/1112.2363v2> [[PDF](#)]
11. † Tang, J.M., Wang, J., and Eisenberg, R.S. (1992) Studies on intact sarcoplasmic reticulum: patch clamp recording and tension measurement in lobster split muscle fibers. in **Ion Channels** (ed.'s B. Rudy and L.E. Iverson), a volume of **Methods in Enzymology**. [[PDF](#)]
12. † Tang, J.M., Wang, J., and Eisenberg, R.S. (1992) Perfusing patch pipettes, easily and quietly. in **Ion Channels** (ed.'s B. Rudy and L.E. Iverson), 207: 176-180 **Methods in Enzymology**. [[PDF](#)]
13. † Tang, J.M., F.N. Quandt, and R.S. Eisenberg. Perfusion of Patch Pipettes. (1995) in **Patch Clamp Techniques and Protocols**. (p.123-140) ed.'s: A.A. Boulton, hG.B. Baker, and W. Walz. Humana Press. [[PDF](#)]
14. † Eisenberg, R.S. (1996a) Atomic Biology, Electrostatics and Ionic Channels. Ch. 5, p. 269-357, in: *New Developments and Theoretical Studies of Proteins*. Edited by Ron Elber in the *Advanced Series in Physical Chemistry*, Vol. 7. World Scientific, Philadelphia. [[PDF](#)] Published July 5, 2008 in arXiv.org with Paper ID [arXiv:0807.0715](#). [[PDF](#)]
15. Eisenberg, R.S. (1996b). Computing the field in proteins and channels. *J. Membrane Biol.* 150:1-25. [[PDF](#)] Posted on arXiv.org with Paper ID [arXiv:1009.2857](#), September 15, 2010.
16. Eisenberg, Bob (1998). Ionic channels in biological membranes. Natural nanotubes. *Accounts of Chemical Research* 31:117-125. [[PDF](#)]
17. Eisenberg, Bob (1998). Ionic Channels in Biological Membranes: Natural Nanotubes described by the Drift-Diffusion Equations. (Invited by and accepted by VLSI Design) *Proceedings of the Fifth International Workshop on Computational Electronics*. 8:75-78. [[PDF](#)]
18. Eisenberg, Bob (1998). Ionic channels in biological membranes. Electrostatic analysis of a natural nanotube. *Contemporary Physics*, 39 (6) 447-466. [[PDF](#)]
19. Nonner, Wolfgang, Chen, Duan, and Bob Eisenberg. (1999). Progress and prospects in permeation. *Journal of General Physiology* 113: 773-782. [[PDF](#)]
20. Eisenberg, R.S. (1999). From Structure to Function in Open Ionic Channels. *Journal of Membrane Biology* 171 1-24. [[PDF](#)] Posted on arXiv.org with Paper ID [arXiv 1011.2939](#)
21. Nonner, Wolfgang, and Bob Eisenberg. (2000) Electrodifusion in Ionic Channels of Biological Membranes. *Journal of Molecular Liquids* 87:149-162. [[PDF](#)]
22. Eisenberg, Bob. (2000). Permeation as a Diffusion Process. Chapter 4 in **Biophysics Textbook On Line “Channels, Receptors, and Transporters”** Louis J. DeFelice, Volume Editor. Location Updated on November 18, 2005 [[PDF](#)] Published July 5,

- 2008 in arXiv.org with Paper ID [arXiv:0807.0721](https://arxiv.org/abs/0807.0721). [PDF] Original Biophysical Society publication is found at [Original](#) and [Original 2](#).
23. Eisenberg, R. (2000) Ionic channels: natural nanotubes described by the drift diffusion equations. *Superlattices and Microstructures*. 27 (5/6) 545-549. [PDF]
  24. Eisenberg, Bob (2003) Proteins, Channels, and Crowded Ions *Biophysical Chemistry* 100: 507 - 517. [Edsall Memorial Volume] [PDF]
  - 24a. Eisenberg, Bob (2003) Erratum to "Proteins, channels and crowded ions", *Biophysical Chemistry* 106 p.93. [N.B., note misprint in title of Erratum in initial, i.e., left quotation marks!] [PDF]
  25. Schuss, Zeev, Nadler, Boaz, Singer, Amit, and Eisenberg, Robert S. Eisenberg. (2002) A PDE formulation of non-equilibrium statistical mechanics for ionic permeation, AIP Conference Proceedings 665, Washington, DC, 3-6 September 2002: *Unsolved Problems Of Noise And Fluctuations*, UPoN 2002, 3rd International Conference on Unsolved Problems of Noise and Fluctuations in Physics, Biology, and High Technology (S.M. Bezrukov, ed.), p.312, Washington, DC. [PDF]
  26. Eisenberg, Bob. (2002) Ionic channels as natural nanodevices. *J. Computational Electronics* 1 331-334. [PDF]
  27. Eisenberg, Bob (2003) Ion channels as devices. *J. Computational Electronics* 2 245-249. [PDF]
  28. Eisenberg, Bob (2005) Living Transistors: a Physicist's View of Ion Channels. Posted on arXiv.org with Paper ID [arXiv:q-bio/0506016v2](https://arxiv.org/abs/q-bio/0506016v2), June 14, 2005. version 2 Aug 25, 2005, posted Feb 3 2008. [PDF]
  29. Saraniti, Marco, Aboud, Shela, and Robert Eisenberg (2006). The Simulation of Ionic Charge Transport in Biological Ion Channels: an Introduction to Numerical Methods. *Reviews in Computational Chemistry* Vol 22, pp 229-294. [PDF]
  30. Eisenberg, Bob. (2008) Ion channels allow atomic control of macroscopic transport. *Physica Status Solidi (c)* 5, 708–713 (2008) /DOI 10.1002/pssc.200777556. [PDF]
  31. Eisenberg, Bob. (2010). Crowded Charges in Ion Channels. *Advances in Chemical Physics* (Stuart Rice, Editor), *Adv. Chem. Phys.* v. 148, pp. 77-223. Posted on arXiv.org with Paper ID [arXiv:1009.1786v1](https://arxiv.org/abs/1009.1786v1) September 9, 2010. [PDF]
  32. Eisenberg, Bob (2011). Life's Solutions are Not Ideal. Posted on arXiv.org with Paper ID [arXiv:1105.0184v1](https://arxiv.org/abs/1105.0184v1), May 3, 2011. [PDF]
  33. Eisenberg, Bob (2011) Mass Action in Ionic Solutions. *Frontiers Article*, and cover of *Chemical Physics Letters*, 511 p. 1-6; DOI: 10.1016/j.cplett.2011.05.037. *Note misprint in address. should be Rush University.* [PDF]
  34. Eisenberg, Bob (2012) Ions in Fluctuating Channels: Transistors Alive. *Fluctuations and Noise Letters* Fluctuation and Noise Letters. 11, No. 2 00076 (20 pages) DOI: 10.1142/S021947751200076X. [PDF]

35. Eisenberg, Bob (2012) Ionic interactions in biological and physical systems: A variational treatment. *Trans. Faraday Society* DOI:10.1039/C2FD20066J (*in the press*) Available at <http://arxiv.org/abs/1206.1517> as arXiv 1206.1517v1 [PDF]
36. Eisenberg, Bob (2012) Ion Channels, in *Encyclopedia of Applied Electrochemistry* (Springer), (*in the press*), Editors: R. Savinell, K. Ota, and G. Kreysa, Topical editor W. Kunz. Available at <http://arxiv.org/abs/1206.1253> as arXiv:1206.1253v1 [PDF]
37. Eisenberg, Bob (2012) Living Devices. Available at <http://arxiv.org/abs/1206.6490> as arXiv:1206.6490v2 [PDF]
38. Eisenberg, Bob. (2012). Life's Solutions. Mathematical Challenge. Available at <http://arxiv.org/abs/1207.4737> as arXiv: 1207.4737v2 [PDF]

***Everything Else:***

1. Eisenberg, R.S. (1975) Electrophysiology. A review of **Electric Current Flow in Excitable Cells**. J.B. Jack, D. Noble and R.W. Tsien. Clarendon (Oxford University Press), New York, 1975, xvi, 502pp. *Science*, 190, p. 1087.
2. Eisenberg, R.S. (1973) Studies of Biomembranes. Book review of **Perspective in Membranes. A Tribute to Kenneth S. Cole**, D.P. Agin (Ed.) Gordon & Breach, New York 319 pp. 1972, *Science* 181: 539. [PDF]
3. Eisenberg, R.S. (1982) Book review of **The Biophysical Approach to Excitable Systems**. Eds. W.J. Adelman, Jr. and D.E. Goldman, Plenum, New York, *Science*, 46: 1102-1103.
4. Eisenberg, R.S. (1987) Gating Current. **Encyclopedia of Neuroscience**, Birkhauser, Boston, MA, p. 449-450.
5. Eisenberg, R.S. (1987) Ionic Channels in Membranes. **Encyclopedia of Neurosciences**. Birkhauser, Boston, MA p. 627-628.
6. Eisenberg, R.S. (1987) Structural Complexity in Nerve Cells. **Encyclopedia of Neuroscience**, Birkhauser, Boston, MA, p. 741-742.
7. Eisenberg, R.S. (1987) Volumes apart. *Nature. Scientific Correspondence* on a paper of Zimmerberg and Parsegian. 325: 114. [PDF]
8. Eisenberg, R.S. (1990) Complexities in solution. *Trends in Biochemical Sciences*, 15:51, A Letter concerning a paper of Payne and Rudnick. [PDF]
9. Eisenberg, RS. (1992) A unified theory of membrane transport. *in Harvard Class of 1962. Thirtieth Anniversary Report*. Harvard University: Office of the University Publisher, Cambridge, MA. [PDF]
10. Eisenberg, R.S. (1993) Popper, Wolpert, and Critics. *Nature* 361 292. [PDF]
11. Bertl, A., Blumwald, E., Coronado, R., Eisenberg, R., Findlay, G., Gradmann, D., Hille, B., Köhler, K., Kolb, H., MacRobbie, E., Meissner, G., Miller, C. Neher, E., Palade, P. Pantoja, O., Sanders, D., Schroeder, J., Slayman, C., Spanswick, R., Walker, A., and



- Williams, A. (1992) Electrical measurements on endomembranes. *Science* 258: 873-874. [[PDF](#)]
12. Chen, D.; Xu, L.; Tripathy, A.; Meissner, G.; Eisenberg, B. (1997) Rate Constants in Channology. *Appendix to Permeation through the Calcium Release Channel of Cardiac Muscle*. *Biophys. J.* 73 1337-1354. [original paper is also cited in this CV] [[PDF](#)]
  13. Eisenberg, Bob (2000) Vignette Applications of Physical Chemistry, a Biological Example. in Berry, Rice, and Ross *Physical Chemistry* (2<sup>nd</sup> Edition, Oxford University Press, p. 1011-1017). [[PDF](#)]
  14. Eisenberg, Bob (2003) Why can't protons move through ion channels? *Biophysical Journal* 85 3427-3428. [[PDF](#)]
  15. Tindjong, R., Applegate, A., Eisenberg, R.S. Kaufman, I., Luchinski, D.G., and PVE McClintock. (2004) Ionic current through an open channel: a low-dimensional model of coupling with vibrations of the wall.<sup>†</sup> In D Abbott, SM Bezrukov, A Der, and A Sanchez, Eds. *Fluctuations and Noise in biological, Biophysical, and Biomedical systems II Proc of SPIE 5467, 2004* 338-344. (Proceedings of Conference in Maspalomas, May 2004). [[PDF](#)]
  16. **Patent Application**, PCT/NL2003/000013 Liquid Based Electronic Device (from BioMade, Groningen, Netherlands.) Patent Application was subsequently withdrawn, but it is an interesting idea, nonetheless, in my biased view, PCT/NL2003/000013 Liquid Based Electronic Device (from BioMade, Groningen, Netherlands.) [[PDF](#)]
  17. Tindjong, R, Eisenberg, R.S. Kaufman, I., Luchinski, D.G., and PVE McClintock. (2005). Brownian dynamics simulation of ionic current through an open channel.<sup>†</sup> In T Gonzalez, J. Mateo, and D. Pardo, Eds *Proc of AIP Conference 780* p. 563-566. (Proceedings of the 18<sup>th</sup> International Conference on Noise and Fluctuations Salamanca, Spain Sept, 2005). [[PDF](#)]
  18. Eisenberg, Bob (2005). Validating the need to validate code. *Physics Today* (Letter to the Editor) 58 (8) p. 13. [[PDF](#)]
  19. Eisenberg, Bob (2006). The value of Einstein's mistakes. "Einstein should be allowed his mistakes ..." *Physics Today* (Letter to the Editor) 59 (4) p.12. [[PDF](#)]
  20. Eisenberg, Bob (2007). New and Notable: Mechanical Spikes from Nerve Terminals. *Biophysical Journal* 92 p. 2983. [[PDF](#)]
  21. Eisenberg, R.S. (2007) Look at biological systems through an engineer's eyes. *Nature* Vol 447, p. 376. [[PDF](#)]
  22. **Patent Application**, Mathematical Design of Ion Channel Selectivity via Inverse Problems Technology (with Heinz Engl and Martin Burger, from Rush University Medical Center.) [[PDF](#)]
  23. Eisenberg, Bob. (2008) Understanding Life with Molecular Dynamics and Thermodynamics: Comment on *Nature* 451, 240-243 (2008). Posted on arXiv.org with Paper ID [arXiv:0802.2244v2](https://arxiv.org/abs/0802.2244v2) [[PDF](#)]

24. Eisenberg, B. (2008) Engineering channels: Atomic biology Proc. Natl. Acad. Sci. U. S. A. 2008 105: p. 6211-6212. [PDF]
25. Eisenberg, B. (2008) Letter to the Editor. New York Times, May 15, p. A30. [PDF]
26. Luchinsky, D.G., Tindjong, R., Kaufman, I. McClintock, P.V.E., R.S. Eisenberg. (2008) Charge fluctuations and their effect on conduction in biological ion channels.<sup>†</sup> Posted on arXiv.org with Paper ID [arXiv.org:0807.0838v1](http://arxiv.org/abs/0807.0838v1) [PDF]
27. Eisenberg, B. (2008) Ionic Selectivity in Channels: complex biology created by the balance of simple physics. Nanotechnology 501 Lecture Series: Purdue University.: Nanohub Purdue University. <http://www.nanohub.org/resources/4726/> [PDF]
28. Eisenberg, B. (2009). Self organized model of selectivity. Available online from Institute for Mathematics and its Applications (IMA) University of Minnesota at [Self-Organized IMA link](#) and posted on arXiv.org with Paper ID <http://arxiv.org/abs/0906.5173> [PDF]
29. Eisenberg, B. (2010). Ion Channels and Selectivity. Kavli Institute of Theoretical Physics. University of California Santa Barbara. Seminar Slides on-line at <http://online.kitp.ucsb.edu/online/evocell10/eisenberg>
30. Bardhan, Jaydeep P., Leaf, Gary K. and Bob Eisenberg. (2010) Reproducible Estimation of Osmotic Coefficients Using the Inverse Monte Carlo Method. Argonne National Laboratory Mathematics and Computer Science Preprint ANL-MCS P1764-0610 [PDF]
31. Eisenberg, Bob. (2010) CSO Deserves Immense Credit. Letter to the Editor, Chicago Tribune, June 4. [PDF]
32. Eisenberg, Bob, Hyon, YunKyong, and Chun Liu. (2010) Energy variational analysis EnVarA of ions in water and channels: Field theory for primitive models of complex ionic fluids, Preprint# 2317 of the reprint series of the Institute for Mathematics and its Applications (IMA, University of Minnesota, Minneapolis) <http://www.ima.umn.edu/preprints/jun2010/jun2010.html> [PDF] *Nearly identical to paper 146.*
33. Hyon, YunKyong, Eisenberg, Bob, and Chun Liu. (2010) A mathematical model for the hard sphere repulsion in ionic solutions Preprint# 2318 of the reprint series of the Institute for Mathematics and its Applications (IMA, University of Minnesota, Minneapolis) <http://www.ima.umn.edu/preprints/jun2010/jun2010.html> [PDF]
34. Mori, Yoichiro, Liu, Chun, and RS Eisenberg (2010) A Model of Electrodiffusion and Osmotic Water Flow and its Energetic Structure. Posted on arXiv.org with Paper ID <http://arxiv.org/abs/1101.5193v1> [PDF], See final version: Papers, No. **Error! Reference source not found.**
35. Eisenberg, Bob. Reduced Models, Sensitivity, and Inverse Problems. (2012) Comment on Paul Krugman Blog of the New York Times. [PDF] <http://kruqman.blogs.nytimes.com/2012/03/02/the-microfoundation-thing-wonkish/#postComment>

*Recent Lectures: available on-line click here [[PPTX](#)]*

**Books:**

1. Eisenberg, R.S., M. Frank, and C.F. Stevens (eds.) (1984) **Membranes, Channels, and Noise.** Plenum Press, NY, pp. 1-54.

**Abstracts:**

1. Eisenberg, R.S. and Gage, P.W. (1968) Electrical properties of frog skeletal muscle fibers with disrupted transverse tubules. *Biophys. J.* 8: A-188.
2. Eisenberg, R.S. and Eisenberg, B. (1968) The extent of disruption of the transverse tubular system in glycerol treated skeletal muscle. *Federation Proceedings* 27: 247.
3. Eisenberg, R.S. and Gage, P.W. (1968) The surface and tubular membranes of frog sartorius muscle fibers. *J. Cell Biol.* 39: 39a .
4. Eisenberg, R.S. and Gage, P.W. (1969) The conductance of the surface and tubular membranes of frog sartorius muscle. *Biophys. J.* 9: A99.
5. Eisenberg, R.S. and Johnson, E.A. (1969) The interpretation of potentials recorded with double-barrel microelectrodes or with a single electrode bridge. *Federation Proceedings* 28: 397.
6. Howell, J., Vaughan, P. and Eisenberg, R.S. (1970) Maintenance of resting potentials in glycerol treated muscle fibers. *Biophys. J.* 10: 75a.
7. Howell, J., Vaughan, P. and Eisenberg, R.S. (1970) Changes in the capacitance of frog skeletal muscle. *Federation Proceedings* 29: 656.
8. Eisenberg, R.S. (1972) The electrical properties of the internal membrane structures of skeletal muscle. *J. Physiol. Soc. Japan.* 34:90.
9. Valdiosera, R., Clausen, C. and Eisenberg, R.S. Impedance of frog skeletal muscle fibers. (1973) *Biophys. Soc. Abst.* 195a.
10. Mobley, B.A., Leung, J. and Eisenberg, R.S. (1974) Longitudinal Impedance of skinned frog muscle fibers. *Federation Proceedings* 33: 401.
11. Peskoff, A. and Eisenberg, R.S. (1974) Influence of extracellular resistance on membrane potential of cells. *Federation Proceeding* 33: 1266.
12. Mathias, R.T., Clausen, C. and Eisenberg, R.S. (1975) Mesh model of the electrical properties of the tubular system of skeletal muscle. *The Physiologist*, 18: August.
13. Clausen, C., Lewis, S.A., Diamond, J.M. and Eisenberg, R.S. (1976) Electrical circuit analysis of tight epithelia by alternating current techniques. *Biophys. J.* 16: 131a.
14. Eisenberg, R.S., Barcion, V. and Mathias, R.T. (1978) Electrical properties of a spherical syncytium. *Biophys. J.* 21: 48a..

15. Mathias, R.T., Rae, J. and Eisenberg, R.S. (1978) Linear electrical properties of the lens of the eye. *Biophys. J.* 21: 48*a*.
16. Eisenberg, B.R. and Eisenberg, R.S. (1980) *T-SR* Junction in activated muscle. *J. Cell. Biol.* 87: 264*a*.
17. Eisenberg, R.S. Structural analysis of electrical properties. (1981) *Biophys. J.* 33: 267*a*.
18. Eisenberg, R.S., Mathias, R.T., and J.L. Rae. (1982) Series resistance measured by integrals of transients. *Biophys. J.* 37: 63*a*.
19. Milton, R.L., Mathias, R.T. and R.S. Eisenberg. (1982) Impedance measurements at the pelvic end of frog sartorius muscle fibers. *Biophys. J.* 37: 356*a*.
20. Hui, C.S., Milton, R.L., and Eisenberg, R.S. (1983) Elimination of charge movement in skeletal muscle by a calcium antagonist. *Biophys. J.* 41: 178*a*.
21. McCarthy, R.T., Milton, R.L., and Eisenberg, R.S. (1983) Paralysis of skeletal muscle fibers by a calcium antagonist. *Biophys. J.* 41: 178*a*.
22. Levis, R.A., Mathias, R.T. and Eisenberg, R.S. (1983) Electrical properties of sheep Purkinje strands: Impedance measurements and voltage clamp simulations including electrodiffusion. *Biophys. J.* 41: 308*a*.
23. Curtis, B.A. and Eisenberg, R.S. A delayed calcium influx related to contraction in frog twitch fibers. (1984) *J. Gen. Physiol.* 84: 36*a*.
24. Cooper, K.E., McCarthy, R.T., Milton, R.L. and Eisenberg, R.S. (1984) Calcium antagonists modify contraction of skeletal muscle fibers. *Biophys. J.* 45: 232*a*.
25. Eisenberg, R.S., Curtis, B.A. and McCarthy, R.T. (1984) Calcium uptake and K<sup>+</sup> contractures in paralyzed and contracting muscle fibers. *Biophys. J.* 45: 234*a*.
26. Eisenberg, R.S. Structural analysis of neuronal integration. (1984) *Biophys. J.* 45: 153*a*.
27. Curtis, B.A. and Eisenberg, R.S. (1984) A delayed influx related to contraction in frog twitch fibers. *J. Gen. Physiol.* 84: 36*a*.
28. Curtis, B.A. and Eisenberg, R.S. (1985) Calcium entry and the repriming period of frog twitch fibers. *Biophys. J.* 47: 132*a*.
29. Eisenberg, R.S. Calcium Signals in Muscle. (1985) *Biophys. J.* 47: 194*a*.
30. Curtis, B.A. and Eisenberg, R.S. (1985) Calcium ions: The link between t depolarization and *SR* Ca release. *Biophys. J.* 47: 195*a*.
31. Cooper, K.E., J.M. Tang, J.L. Rae and R.S. Eisenberg. (1985) Cation selective channel in the epithelium of frog lens. *Biophys. J.* 86: 9*a*.
32. Cooper, K.E., J.M. Tang, J.L. Rae and R.S. Eisenberg. (1985) Cation-selective channel in the epithelium of frog lens. *J. Gen. Physiol.* 86: 9*a*-10*a*.
33. Cooper, K.E., J.M. Tang, J.L. Rae and R.S. Eisenberg. (1986) A cation-selective channel from frog lens epithelium. *Biophys. J.* 49: 6*a*.

34. Cooper, K.E., Gates, P.Y., and R.S. Eisenberg. (1987) Rate constants for ionic diffusion over barriers. *Biophys. J.* 51: 48a.
35. Gates, P.Y., Cooper, K.E., and R.S. Eisenberg. (1987) Diffusive flux through ionic channels. *Biophys. J.* 51: 48a.
36. Tang, J. M., Wang, J., and R.S. Eisenberg. (1987) Patch clamp of sarcoplasmic reticulum within muscle fibers. *Biophys. J.* 51: 106a.
37. Eisenberg, R.S., Hainsworth, A.H., and R.A. Levis. (1987). Open-channel noise in a cation channel of the frog lens epithelium. *J. Physiol. (London)* 396: 84P.
38. Hainsworth, A., Tang, J.M., Wang, J., Levis, R.A., and R.S. Eisenberg. (1988) Open channel noise in the  $K^+$  channel of the sarcoplasmic reticulum. *Biophys. J.* 53: 151a.
39. Cooper, K.E., Gates, P.Y., and R.S. Eisenberg. (1988) Diffusion theory and discrete rate constants in ion permeation. *Biophys. J.* 55: 152a.
40. Moghaddamjoo, A., Levis, R.A., and R.S. Eisenberg. (1988). Automatic detection of channel currents. *Biophys. J.* 55: 153a.
41. R.S. Eisenberg. Channels as Enzymes (*title only*). (1988) *Medical Physics* 15: No. 4, p. 440.
42. J. Wang, J.M. Tang, and R.S. Eisenberg. (1989)  $Ca^{++}$  channels in the sarcoplasmic reticulum (SR) of skinned lobster muscle fibers: patch clamp measurements. *J. Cell Biology* 107:144a.
43. R.S. Eisenberg, A.H. Hainsworth, and R.A. Levis. Open-channel noise in the potassium channel of lobster sarcoplasmic reticulum. (1988) *J. Physiol. (Cambridge Meeting, July)*: 107P.
44. J. Wang, J.M. Tang, and R.S. Eisenberg.  $Ca^{++}$  channels from sarcoplasmic reticulum of split lobster muscle fibers. (1989) *Biophysical J.* 55: 207a.
45. A. Hainsworth, R.A. Levis, and R.S. Eisenberg. (1989) Excess open-channel noise in the SR  $K^+$  channel. *Biophysical J.* 55: 200a.
46. R.S. Eisenberg, A.H. Hainsworth, R.A. Levis. (1989) The effect of temperature on open-channel noise in the potassium channel of the lobster sarcoplasmic reticulum. *J. Physiol.* 410: 18P.
47. J.M. Tang, J. Wang, F.N. Quandt, and Eisenberg, R.S. (1990) Perfusing patch pipettes quietly and easily. *Biophys. J.* 57: 171a.
48. J.M. Tang, J. Wang, T. Lea and Eisenberg, R.S. (1990) Contractures and reloading in skinned lobster muscle fibers. *Biophys. J.* 57: 171a.
49. R.S. Eisenberg, J.M. Tang, and J. Wang. (1991) Ionic channels of the sarcoplasmic reticulum of lobster remotor muscle. *Biophys. J.* 59: 177a.
50. D.P. Chen and R.S. Eisenberg. (1991) Constant fields and constant gradients in open ionic channels. *Biophys. J.* 59: 404a.
51. R.S. Eisenberg, D.P. Chen, and V. Barcion. (1991) Constant fields and constant gradients in open ionic channels. *Physiologist.* 34: 102.

52. Wang, J., Tang, J.M., and RS Eisenberg. (1992) Calcium conducting channel in SR: calcium pump without occlusion? *Biophys. J.* 61. A433.
53. Chen, DP, Barcion, V. and RS Eisenberg. (1992) Induced and permanent charge in open ionic channels. *Biophys. J.* 61. A11.
54. Chen, DP, and R Eisenberg. (1992) Exchange diffusion, single filing, and gating in macroscopic channels of one conformation. *J. Gen. Physiol.* 100: 9a.
55. Eisenberg, Robert From Structure to Permeation in Open Ionic Channels. (1993) *Biophys. J.* 64:A22. [[PDF](#)]
56. Eisenberg, Robert and Duanpin Chen. (1993) Poisson-Nernst-Planck (*PNP*) theory of an open ionic channel. *Biophys. J.* 64:A22. [[PDF](#)]
57. Chen, Duanpin and Robert Eisenberg. (1993) Poisson-Nernst-Planck (*PNP*) theory of open ionic channels. *Biophys. J.* 64:A22. [[PDF](#)]
58. Chen, Duan P. and Robert S. Eisenberg. (1994) Divalent effects on mono-valent cation channels, an extension of Poisson-Nernst-Planck theory. *Biophys. J.* 66(2) A292.
59. Elber, Ron, Duan Chen, Danuta Rojewska, and Bob Eisenberg. (1994) Na<sup>+</sup> in Gramicidin: the prototype permion. *Biophys. J.* 66(2) A354.
60. Eisenberg, Bob, Malgorzata Kłosek, and Zeev Schuss. (1994) Stochastic theory of the open channel. *Biophys. J.* 66(2) A354.
61. Chen, Duan, Paul Kienker, Jim Lear and Bob Eisenberg. (1995) PNP Theory fits current-voltage (*IV*) relations of a synthetic channel in 7 solutions. *Biophys. J.* 68:A370.
62. Chen, Duan, Wolfgang Nonner, and Bob Eisenberg. PNP (1995) Theory fits current-voltage (*IV*) relations of a neuronal anion channel in 13 solutions. *Biophys. J.* 68:A370
63. Chen, D., Eisenberg, R., Jerome, J., and Shu, C. (1995) PH (Poisson-Hydrodynamic) Theory of an open channel. *Biophys. J.*, 68:A371.
64. Tang, John, Rick Levis, Kelvin Lynn, and Bob Eisenberg. (1995) Opening and closing transitions of a large mitochondrial channel with microsecond time resolution. *Biophys. J.*, 68:A145, 1995.
65. Janovic, Slobidan, Kelvin Lynn, Xaioye Wu, Bob Eisenberg, and Rick Levis. (1995) Real-time analysis of single channel currents. *Biophys. J.*, 68:A42.
66. Eisenberg, Robert S., Chen, P. Solutions to Fields in Biological Channels. (1996) American Chemical Society, Division of Physical Chemistry, 212<sup>th</sup> Meeting. *Printed but perhaps not published Abstract.*
67. Chen, D., Xu, L., Tripathy, A., Meissner, G., and R. Eisenberg (1997) Permeation through the calcium release channel (CRC) of cardiac muscle. *Biophys. J.*, 72:A108.
68. Tang, J., Chen, D., Saint, N., Rosenbusch, J., and R. Eisenberg (1997). Permeation through porin and its mutant G119D. *Biophys. J.*, 72:A108, 1997.
69. Tang, J., Saint, N., Rosenbusch, J., and R. Eisenberg (1997). Currents through single channels of maltoporin. *Biophys. J.*, 72:A108, 1997.

70. Gardner, Carl, Eisenberg, B., and Joe Jerome. (1998) Numerical simulation of rectangular channel currents. *Biophys. J.*, 74 A342.
71. Schuss, Zeev and Eisenberg, B. (1998) Stochastic and continuum models of unidirectional fluxes in open ionic channels. *Biophys. J.*, 74 A342.
72. Elber, R. and Eisenberg, B. (1998) Molecular dynamics simulations of solvated ions between a membrane and metal electrodes at various electric potentials. *Biophys. J.*, 74 A342.
73. Chen, D., Tripathy, A., Xu, L., Meissner, G. and Bob Eisenberg. (1998) Permeation in the calcium release channel (CRC) of skeletal muscle. *Biophys. J.*, 74 A342.
74. Chen, D., Tripathy, A., Xu, L., Meissner, G. and Bob Eisenberg. (1998) Selectivity of calcium release channel (CRC) of cardiac muscle. *Biophys. J.*, 74 A342.
75. Nonner, W., Chen, D. and Bob Eisenberg. (1998) Anomalous mole fraction effects: an electrostatic interpretation. *Biophys. J.*, 74 A342.
76. Nonner, W. and Bob Eisenberg. (1998) Calcium channel permeability and glutamate residues linked by PNP Theory. *Biophys. J.*, 74 A342.
77. Catacuzzeno, L., W. Nonner, and B. Eisenberg. (1999) PNP2 Links Crystallographic Structure and Conduction in K Channels. *Biophysical Journal*. 76:A79.
78. Gillespie, D, and Bob Eisenberg. (1999) An analytic formula for the reversal potential derived from *PNP* theory. . *Biophysical Journal*. 76:A192.
79. Hollerbach, U., Chen, D., Nonner, W., and Bob Eisenberg. (1999) Three-dimensional Poisson-Nernst-Planck Theory of Open Channels. *Biophysical J.* *Biophysical J.* 76:A205.
80. Catacuzzeno, L., W. Nonner, L. Blum, and B. Eisenberg. Ca Selectivity in the 'EEEE' Locus of L-type Ca Channels. (1999) *Biophysical Journal*. 76:A259.
81. Nonner, W, L. Catacuzzeno, and B. Eisenberg. (2000) Ionic selectivity in K channels. *Biophysical Journal*. 78:A96.
82. Nonner, W, L. Catacuzzeno, and B. Eisenberg. (2000) Ionic selectivity in calcium channels. *Biophysical Journal*. 78:A455.
83. Chen, Duan, Le Xu, Bob Eisenberg, and Gerhard Meissner. (2000) Calcium and potassium ion selectivity of skeletal muscle ryanodine receptor. *Biophysical Journal*. 78:A462.
84. van der Straaten, T.A., RS Eisenberg, JM Tang, U Ravaioli, and N Aluru. (2001) Three dimensional Poisson Nernst Planck Simulation of ompF porin. *Biophysical Journal*. 80: 115a.
85. Chen, Duan, L Xu, B Eisenberg, and G Meissner. (2001) Ca ion permeation through the calcium release channel (ryanodine receptor) of cardiac muscle *Biophysical Journal*. 50: 115a.
84. Nonner, W., B Eisenberg, and D Henderson (2001) Ca channel selectivity: the role of solvent *Biophysical Journal*. 80:453a.

85. Nonner, W., Gillespie, D., and B Eisenberg. (2002) Flux and selectivity in the Ca channel: a density functional approach. *Biophysical Journal*. 82: 340a.
86. Gillespie, D. and RS Eisenberg. (2002) Measurements of selectivity: physical interpretation. *Biophysical Journal*. 82:206a.
87. Van der Straaten, T.A., Tang, J.M., Eisenberg, RS, Ravaioli, U., Aluru, N., Varma, S., and E. Jakobsson. (2002) A study of mutations of ompf porin using Poisson-Nernst-Planck theory. *Biophys. J.* 82: 207a.
88. Chiu, See-Wing, Varma, S., Jakobsson, E., Tang, J.M., van der Straaten, T., Eisenberg, and R.S. (2002) Molecular dynamics of permeation in porin and its mutant G119D. *Biophysical Journal*. 82:208a.
89. Gillespie, D., Nonner, W., and Bob Eisenberg. (2002) Physical model of selectivity and flux in Na channels. *Biophysical Journal* 84 (Number 2) p. 67a.
90. Nonner, Wolfgang, Gillespie, Dirk, Eisenberg, Bob, and Douglas Henderson. (2002) A physical basis for large-ion selectivity. *Biophysical Journal* 84 (Number 2) 93a.
91. Chen, Duan, Kuang, Zhifeng, Boda, Deszo, Eisenberg, Bob, Busath, David and Douglas Henderson. (2003) Ion channel permeation simulated by non-equilibrium molecular dynamics calibrated by equilibrium Monte Carlo. *Biophysical Journal* 84 (Number 2) 94a.
92. Boda, Dezso, Gillespie, Dirk, Nonner, Wolfgang, Henderson, Douglas, Busath, David, and Bob Eisenberg. (2004) Effects of dielectrics on selectivity: computing induced charge in Monte Carlo simulations. *Biophysical Journal* 86 6a.
93. Miedema, Henk, Meter-Arkema, Anita, Wierenga, Jenny, Hektor, Hans, Tang, John, Eisenberg, Bob, and Wim Meijberg. (2004) Permeation properties of an engineered OmpF containing the EEEE locus of Ca-channels. *Biophysical Journal* 86 260a.
94. Nonner, Wolfgang, Gillespie, Dirk, and Bob Eisenberg. (2004) Moving gating charges: comparing electrostatic energetics of the S4 motion of different models. *Biophysical Journal* 86 436a.
95. Aguilera-Arzo, Marcel, Garcia-Celma, Juan, Aguilera, Vicente, and Robert Eisenberg. (2004) Computing numerically access resistance of a channel. *Biophysical Journal* 86 629a.
96. Peyser, Alexander, Nonner, Wolfgang R., Gillespie, Dirk, and Eisenberg Bob. (2005) Electrostrictive Forces in S4 Models. *Biophysical Journal* 88 458a.
97. Henderson, D., Boda, D., Valisko, M., Gillespie, D, Eisenberg, B., and Nonner, W. (2005) New constant voltage method of simulating ions in a dielectric near a metallic electrode *PacifiChem 2005, Honolulu HI*.
98. Eisenberg, R. S. (2005) Ions in channels: Life's transistors *PacifiChem 2005, Honolulu HI*.
99. Wilk, S.J., Petrossian, L., Goryll, M., Thornton, T.J., Goodnick, S.M., Tang, J.M., and Eisenberg, R.S. (2005) Integrated Platform for Ion Channel Sensing. *IEEE SENSORS 2005: the 4th IEEE conference on sensors*.



100. Siwy, Z, Powell, M., Kalman, E., Heins, E., Martin, C.R., and Eisenberg, R.S.. (2006). Pores in plastic can be calcium sensitive and gate. *Biophysical Journal* 90 314a.
101. Boda, Dezso, Valisko, Monika, Gillespie, Dirk, Nonner, Wolfgang, Henderson, Douglas and Eisenberg, Bob. (2006) Dielectrics Enhance the Selectivity of Calcium Channels. *Biophysical Journal* 90 404a.
102. Nonner, Wolfgang, Gillespie, Dirk, and Eisenberg, Bob. (2006) How Do Long Pores Make Better K Channels? *Biophysical Journal* 90 239a.
103. Eisenberg, Bob. (2007) . How can a channel tell  $\text{Ca}^{2+}$  from  $\text{Na}^{+}$  ? *Biophysical Journal* 92 342a; Symposium 14: Modeling as a Tool in Biophysics.
104. Siwy, Zuzanna S., Powell, Matthew R., Kalman, Eric, and Eisenberg Robert S. (2007) Gating, Modulation, and Rectification in a Large Diameter Abiotic Nanopore. *Biophysical Journal* 92 342a Symposium 14: Modeling as a Tool in Biophysics.
105. Boda, Dezso, Valisko, Monika, Eisenberg, Bob, Nonner, Wolfgang, Henderson, Douglas, and Gillespie, Dirk. (2007) The effect of the protein dielectric coefficient and pore radius on the Na affinity of a model sodium channel. *Biophysical Journal* 92 p. 609a. Poster [[PDF](#)]
106. Powell, Matthew R., Sullivan, Michael, Siwy, Zuzanna S., and Eisenberg. Robert S. (2007) Stochastic Sensing of Analytes by a Synthetic Nanopore with Adaptor. *Biophysical Journal* 92 p. 649a.
107. Arning, Katrin, Burger, Martin, Engl, Heinz, Eisenberg, Robert, He, Lin, and Marie Wolfram. (2007) Simulation of ion transport through nanopores. International Conference on Simulation of Semiconductor Processes and Devices (SISPAD).
108. Powell, Matthew R., Sullivan, Michael, Vlassiuk, Ivan, Constantin, Dragos, Sudre, Olivier, Martens, Craig, Eisenberg, Robert S., and Siwy, Zuzanna. (2008) Ion Current Oscillations Caused by Femtoliter Volume Precipitation in a Nanopore. *Biophysical Journal* 94 p. 333a. Poster [[PDF](#)]
109. Boda, Dezső, Nonner, Wolfgang, Valisko, Monika, Henderson, Douglas, Eisenberg, Bob, and Gillespie, Dirk. (2008) Competition of Steric repulsion and Electrostatic Attraction in the Selectivity Filter of Model Calcium Channels. *Biophysical Journal* 94 p. 447a. Poster [[PDF](#)]
110. Eisenberg, Bob, Roth, Roland, Gillespie, Dirk, and Nonner, Wolfgang. (2008) Bubbles, Gating, and Anesthetics in Ion Channels. *Biophysical Journal* 94 p. 1040a. Abstract [[PDF](#)]
111. Eisenberg, Bob, Boda, Dezső, Giri, Janhavi, Fonseca, James, Gillespie, Dirk, Henderson, Doug, and Nonner, Wolfgang. (2009) Self-organized Models of Selectivity in Ca and Na Channels. *Biophysical Journal*, Volume 96, Issue 3, 253a. Abstract [[PDF](#)] and Poster [[PDF](#)] Other versions available at Institute of Mathematics and its Applications IMA, University of Minnesota, [Self-Organized IMA link](#) and on the arXiv.org with Paper ID [arXiv:0906.5173](#) [[PDF](#)]

112. Knepley, Matthew G., Karpeev, Dmitry A., Eisenberg, Robert S., and Gillespie, Dirk. (2009) Energetics of Calcium Selectivity: A Three-Dimensional Classical Density Functional Theory Approach. *Biophysical Journal*, Volume 96, Issue 3, 661a. Abstract [\[PDF\]](#) and Poster [\[PDF\]](#)
113. Mori, Yoichiro, Liu, Chun, and RS Eisenberg (2010) A multidomain model for electrodiffusion and water flow Volume 98 pp. 96a Abstract [\[PDF\]](#) and Poster 511 [\[PDF\]](#)
114. Fonseca, James E. Boda, Dezső, Nonner, Wolfgang, and Bob Eisenberg (2010) Conductance and concentration relationship in a reduced model of the K<sup>+</sup> channel. Volume 98 pp. 117a Abstract [\[PDF\]](#) and Poster 613 [\[PDF\]](#)
115. Zhang, Chao, Raugei, Simone, Eisenberg, Bob, and Paolo Carloni. (2010) On the domain of applicability of currently used force fields for the calculation of the activity of alkali ions at physiological ionic strength. *Biophysical Journal*. Volume 98 pp. 330a - 331a. Abstract [\[PDF\]](#) and Poster 1718 [\[PDF\]](#)
116. Giri, Janhavi, Eisenberg, Bob, Gillespie, Henderson, Douglas, and Dezső Boda. (2010) Monte Carlo simulation of free energy components. Energetics of selective binding in a reduced model of L-type Ca<sup>2+</sup> channels. *Biophysical Journal*. Volume 98 pp. 514a – 515a Abstract [\[PDF\]](#) and Poster 2665 [\[PDF\]](#)
117. Eisenberg, Robert S., Hyon, YunKyong, and Chun Liu. (2010) Energetic Variational Analysis *EnVarA* of ions in calcium and sodium channels. *Biophysical Journal*. Volume 98 pp. 515a. Abstract [\[PDF\]](#) and Poster 2666 [\[PDF\]](#)
118. Mori, Y., C. Liu, and R.S. Eisenberg, (2011) Electrodiffusion and Osmotic Water Flow and its Variational Structure. *Biophysical Journal*. 100 (3): p. 86a-87a. Abstract 466-Pos [\[PDF\]](#) and Poster Board B266 [\[PDF\]](#)
119. Berti, C., D. Gillespie, B. Eisenberg, S. Furini, and C. Fiegna, (2011) A novel Brownian-Dynamics Algorithm for the Simulation of Ion Conduction Through Membrane Pores. *Biophysical Journal*. 100 (3): p. 158a. Abstract 867-Pos [\[PDF\]](#) and Poster Board B667 [\[PDF\]](#)
120. Ryham, R., R. Eisenberg, C. Liu, and F. Cohen, (2011) A Continuum Variational Approach to Vesicle Membrane Modeling. *Biophysical Journal*. Volume 100 (3): p. 187a. Abstract [\[PDF\]](#) and 1025-Plat [\[PDF\]](#)
121. Jimenez-Morales, D., J. Liang, and B. Eisenberg, (2011) Active Sites of Enzymes are Crowded with Charge. *Biophysical Journal*. 100 (3): p. 218a. Abstract 1191-Pos [\[PDF\]](#) and Poster Board B101 [\[PDF\]](#)
122. Hyon, Y., J.E. Fonseca, B. Eisenberg, and C. Liu, (2011) A new Poisson-Nernst-Planck Equation (PNP-FS-IF) for charge inversion near walls. *Biophysical Journal*. 100 (3): p. 578a. Abstract 3130-Pos [\[PDF\]](#) and Poster Board B235 [\[PDF\]](#)
123. Giri, J., J.M. Tang, C. Wirth, C.M. Peneff, T. Schirmer, and B. Eisenberg, (2011) Single Channel Measurements of N-Acetylneuraminic Acid-Inducible Channel (NANC) in *E. coli*. *Biophysical Journal*. Volume 100 (3): p. 579a. Abstract 3136-Pos [\[PDF\]](#) and Poster Board B241 [\[PDF\]](#)

124. Giri, J., J.M. Tang, C. Wirth, C.M. Peneff, T. Schirmer, and B. Eisenberg, (2011) Sialic Acid Transport in *E. coli*: Role of Outer Membrane Porin NanC. *Biophysical Journal*. 100 (3): p. 577a. Abstract 3123-Pos [[PDF](#)] and Poster Board B228 [[PDF](#)]
125. Jimenez-Morales, D., J. Liang, and B. Eisenberg, (2011) Active Sites of Enzymes are Crowded with Charge. 6<sup>th</sup> Annual Midwest Conference on Protein Folding, Assembly, and Molecular Motions. University of Notre Dame. (*not published*) [[PDF](#)]
126. Ryham, Rolf, Fredric S. Cohen, Robert Eisenberg, Chun Liu3. (2012) A dynamic model of fusion pores in lipid bilayers *Biophysical Journal*. 102 (3) pp. 500a - 501a. Abstract 2551-Pos [[PDF](#)] and Poster Board B321 [[PDF](#)]
127. Berti, Claudio, Simone Furini, Dirk Gillespie, Dezső Boda, Bob Eisenberg, Claudio Fiegna. (2012) Brownian Dynamics Simulation of Calcium Channels. *Biophysical Journal* 102 (3) pp. 173a. Abstract 861-Pos [[PDF](#)] and Poster Board B647 [[PDF](#)]
128. Eisenberg, Bob. (2012) Rate Constants are Variables in Almost all Chemical Reactions. *Biophysical Journal* 102 (3) pp. 447a - 448a. Abstract 1370-Pos [[PDF](#)] and Poster Board B140 [[PDF](#)]

[\[Laboratory of Robert S. Eisenberg\]](#)