## ROBERT S. EISENBERG

## **PUBLICATIONS**

(Last update: April 15, 2019)

Reprints available on this <u>hyperlink</u> or by clicking [PDF] here or below. NIH maintained "My Bibliography: Bob Eisenberg"

at <a href="http://goo.gl/Z7a2V7">http://goo.gl/Z7a2V7</a>

or

https://www.ncbi.nlm.nih.gov/myncbi/browse/collection/47999805/?sort=date&direction=ascending

[Laboratory of Robert S. Eisenberg]

Publication List maintained for all these years with loving care by John Tang, with thanks from Bob!

## <u>Papers</u>: Electrical properties of tissues, mostly experimental:

- 1. Eisenberg, R.S. and Hamilton, D. Action of γ-aminobutyric acid on *Cancer borealis* muscle. Nature 198: 1002-1003 (1963). PMCID not available [PDF]
- 2. Eisenberg, R.S. Impedance of single crab muscle fibers. Ph.D. Thesis, University of London (1965). PMCID not available [PDF]
- 3. Eisenberg, R.S. The equivalent circuit of single crab muscle fibers as determined by impedance measurement with intracellular electrodes. J. Gen. Physiol. 50: 1785-1806 (1967). PMCID: PMC2225735 [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). PMID: 6070028 [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). <a href="PMID: 6059652">PMID: 6059652</a> [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). <a href="PMCID: PMC2201208">PMCID: PMC2201208</a> [PDF]
- 7. Eisenberg, B. and Eisenberg, R.S. The transverse tubular system in glycerol treated muscle. Science 160: 1243-1244 (1968). PMID: 5648264 [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). PMCID: PMC2107525 [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). <a href="PMC2202908">PMCID: PMC2202908</a> [PDF]
- 10. Eisenberg, R.S. and Gage, P.W. Ionic conductances of the surface and transverse tubular membrane of frog sartorius fibers. J. Gen. Physiol. 53: 279-297 (1969). <a href="PMC10:202906">PMC10:202906</a> [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). PMCID: PMC2202907 [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). <a href="PMCID: PMC1331868">PMCID: PMC1331868</a> [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). <a href="PMCID: PMC2203175">PMCID: PMC2203175</a> [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). PMCID: PMC2203177 [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). <a href="PMID: 4541500">PMID: 4541500</a> [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). <a href="PMCID: PMC1334509">PMCID: PMC1334509</a> [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). PMCID: PMC2203561 [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). <a href="PMC10: PMC2203562">PMCID: PMC2203562</a> [PDF]
- 19. Mobley, B.A., Leung, J. and Eisenberg, R.S. Longitudinal impedance of skinned frog muscle fibers. J. Gen. Physiol. 63: 625-637 (1974). PMCID: PMC2203567 [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). PMCID: PMC2214864 [PDF]
- 21. Eisenberg, R.S. and Rae, J.L. Current-voltage relationships in the crystalline lens. J. Physiol. 262: 285-300 (1976). PMCID: PMC1307644 [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). PMCID: PMC1473227 [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). PMID: 290301 [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). <a href="PMCID: PMC1328454">PMCID: PMC1328454</a> [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). PMCID not available [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). PMCID: PMC1327454 [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). PMCID: PMC2215487 [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). <a href="PMID: 6983973">PMID: 6983973</a>
  [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). <a href="PMID: 6983449">PMID: 6983449</a> [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). <a href="PMCID: PMCID: PMC1195346">PMCID: PMC1195346</a> [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). PMCID: PMC1434818 [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). PMCID: PMC345107 [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). PMCID: PMC2215793 [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). PMCID: PMC1329317 [PDF]
- 35. Eisenberg, R.S. Membranes, calcium, and coupling. Can. J. Physiol. and Pharmacol: 65 686-690 (1987). PMID: 2440543 [PDF]

## <u>Papers</u>: Theoretical Analysis and Modeling of Spread of Current:

- 36. Eisenberg, R.S. and Johnson, E.A. Three dimensional electrical field problems in physiology. Prog. Biophys. Mol. Biol. 20: 1-65 (1970). PMCID not available [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). <a href="PMC2203023">PMCID: PMC2203023</a> [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). PMCID not available [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). <a href="PMC1D: PMC1D: PMC226046">PMC2226046</a> [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). PMCID: PMC1484114 [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). PMCID not available [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). PMCID not available [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). <a href="https://pmid.edu/pm
- 44. Peskoff, A. and Eisenberg, R.S. A point source in a cylindrical cell: potential for a stepfunction of current inside an infinite cylindrical cell in a medium of finite conductivity. UCLA Engineering Report #7421, 73pp. (1974). PMCID not available [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). PMCID not available [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). PMCID not available [PDF]
- 47. Eisenberg, R.S., Barcilon, V., and Mathias, R.T. Electrical properties of spherical syncytia. Biophys. J. 25: 151-180 (1979). PMCID: PMC1328453 [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). PMCID: PMC2228590 [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). PMID: 2434653 [PDF]
- 50. K.E. Cooper, P.Y. Gates, and Eisenberg, R.S. Surmounting barriers in ionic channels. Quart. Rev. Biophysics. 21: 331-364 (1988). PMID: 2464837 [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). PMID: 2465414 [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). <a href="PMC10">PMC10</a>: <a href="PMC2228942">PMC2228942</a> [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). PMCID not available [PDF]
- 54. P.Y. Gates, K.E. Cooper, and Eisenberg, R.S. Analytical diffusion models for membrane channels. *in* 2:223-81 **Ion Channels, Volume 2** (editor. T. Narahashi), Plenum Press (1990). PMID: 1715205 [PDF]
- 55. D. Junge and R.S. Eisenberg. Uniqueness and interconvertibility among membrane potassium channels. Comments on Theoret. Biology. 11: 45-55 (1990). PMCID not available [PDF]
- 56. Tang, J.M., Wang, J., F.N. Quandt, and R.S. Eisenberg. Perfusing pipettes. Pflügers Arch. 416:347-350 (1990). PMID: 2381768 [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). <a href="mailto:PMCID: PMCID: PMC1260399">PMCID: PMC1260399</a> [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). PMCID not available [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). <a href="PMID: 1283985">PMID: 1283985</a> [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). PMCID not available [PDF]
- 61. Chen, D.P. and R.S. Eisenberg. Charges, currents, and potentials in ionic channels of one conformation. Biophysical Journal. 64:1405-1421 (1993*a*). PMCID: PMC1262466 [PDF]
- 62. Chen, D.P. and R.S. Eisenberg. Flux, coupling, and selectivity in ionic channels of one conformation. Biophysical Journal 65:727-746 (1993*b*). PMCID: PMC1225775 [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). PMCID: PMC2229236 [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). PMCID not available [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). <a href="mailto:PMC1281815">PMCID: PMC1281815</a> [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). <a href="PMCI236469">PMCI236469</a> [PDF]
- 67. Barkai, E., Eisenberg, R.S., and Schuss, Z. (1996). A bidirectional shot noise in a singly occupied channel. Physical Review E, 54 1161-1175. <a href="PMID: 9965184">PMID: 9965184</a> [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. PMCID: PMC1184300 [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. PMCID not available [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. <a href="PMCID: PMC1181034">PMCID: PMC1181034</a> [PDF]
- 71. Nonner, W.; Chen, D.; Eisenberg, B. (1998) Anomalous Mole Fraction Effect, Electrostatics, and Binding in Ionic Channels. Biophys. J. 74 2327-2334. <a href="PMCID: PMC1299576">PMCID: PMC1299576</a>
- 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. PMCID: PMC1299804 [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. <a href="PMCID: PMC1300114">PMCID: PMC1300114</a> [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. PMCID not available [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. PMCID not available [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. PMCID: PMC1301088 [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. PMCID not available [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. PMID: 11415140 [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. PMCID not available [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. <a href="PMID: 11580403">PMID: 11580403</a> [PDF]
- 81. Hess, K., Ravaioli, 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. PMCID not available [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. PMCID not available [PDF]
- 83. Gillespie, Dirk, and Eisenberg, Robert S. (2002). Physical descriptions of experimental selectivity measurements in ion channels. European Biophysics Journal 31: 454-466). PMID: 12355255 [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. PMCID not available [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. PMID: 12419658 [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. PMCID not available [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 PMCID not available [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. PMCID not available [PDF]
- 89. Hollerbach, Uwe and Robert Eisenberg. (2002) Concentration-Dependent Shielding of Electrostatic Potentials Inside the Gramicidin A Channel. Langmuir 18: 3262-3631. PMCID not available [PDF]
- 90. Gillespie, D., Nonner, W. and RS Eisenberg. (2003) Crowded Charge in Biological Ion Channels Nanotech 3: 435-438. PMCID not available [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. PMCID not available [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. PMCID not available [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. PMCID not available [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. PMCID not available [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. PMCID not available [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. <a href="PMID: 14525004">PMID: 14525004</a>
- 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. PMID: 14524773 [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. PMCID not available [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. PMCID not available [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. PMCID not available [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. PMID: 15169126 [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. PMCID not available [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. PMCID not available [PDF]

- 104. Nadler, Boaz, Schuss, Zeev, Singer, Amit, and RS Eisenberg. (2004) Ionic diffusion through confined geometries: from Langevin equations to partial differential equations. J. Physics: Condensed Matter 16: S2153-S2165. PMCID not available [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. PMCID not available [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 Ca2+ channels. Biophysical Journal Volume 87: 3137–3147. doi: 10.1529/biophysj.104.041384 PMCID: PMC1304784 [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. PMCID not available [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 PMCID not available [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. <a href="PMID: 15600661">PMID: 15600661</a> [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. doi: 10.1529/biophysj.104.047548 PMCID: PMC1304885 [PDF]
- 111. Singer, A., Schuss, Z., Nadler, B., and RS Eisenberg (2004) Memoryless control of boundary concentrations of diffusing particles. Phys Rev E 70, 061106. <a href="PMID: 15697340">PMID: 15697340</a> [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. PMCID not available [PDF]
- 113. Aguilella-Arzo, Marcel, Aguilella, Vicente and R. S. Eisenberg (2005) Computing numerically the access resistance of a pore. European Biophysics Journal, 34: 314-322. PMID: 15756588 [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. PMCID not available [PDF]

- 115. Marreiro, David, Aboud, Shela, Saraniti, Marco, and Robert Eisenberg.(2005) Error Analysis of the Poisson P3M Force Field Scheme for Particle-Based Simulations of Biological Systems. Journal of Computational Electronics 4: 179–183. PMCID not available [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. PMCID not available [PDF] Posted on https://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.), <u>Ionic Soft Matter: Modern Trends in Theory and Applications</u>, Springer NY. PMCID not available [PDF]
- 118. Singer, Amit, Schuss, Zeev, Holcman, David and R. S. Eisenberg. (2006) Narrow Escape. Part I, J. Stat. Phys. 122, 437-463. PMCID not available [PDF] Posted on https://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. <a href="PMID: 16522045">PMID: 16522045</a> [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. <a href="PMID: 16858566">PMID: 16858566</a> [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. <a href="PMID: 16895364">PMID: 16895364</a> [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.

  PMID: 16863379 [PDF]
- 123. Miedema, Henk, Vrouenraets, Maarten, Wierenga, Jenny, Gillespie, Dirk, Eisenberg, Bob, Meijberg, Wim and Wolfgang Nonner. (2006) Ca<sup>2+</sup> selectivity of a chemically modified OmpF with reduced pore volume. Biophysical J. 91 4392-4400. doi: 10.1529/biophysj.106.087114 PMCID: PMC1779923 [PDF]
- 124. Eisenberg, Bob, Nonner, Wolfgang (2007) Shockley-Ramo Theorem Measures Conformation Changes of Ion Channels and Proteins. J Computational Electronics 6:363-345. PMCID not available [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. PMCID not available [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. PMCID not available [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. PMID: 17501467 [PDF]
- 128. Boda, Dezső, 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. doi: 10.1529/biophysj.107.105478 PMCID: PMC1959557 [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 Platform. Biosensors and Bioelectronics <u>Volume 23, Issue 2</u>, 30 September 2007, Pages 183-190. doi:10.1016/j.bios.2007.03.030. PMID: 17507211 [PDF]
- 130. Miedema, Henk Vrouenraets, Maarten Wierenga, Jenny Meijberg, Wim, Robillard, George and Bob Eisenberg (2007) A biological porin engineered into a molecular, nanofluidic diode. Nanoletters 7: 2886-2891. PMID: 17691852 [PDF]
- 131. D G Luchinsky, R Tindjong, P V E McClintock, I Kaufman and R S Eisenberg, "On selectivity and gating of ionic channels", in S M Bezrukov ed. *Noise and Fluctuations in Biological, Biophysical and Biomedical Systems*, Proc. of conf. in Florence, 2007, SPIE Proc. **6602** (SPIE, Bellingham, WA, 2007), art. no. 66020D. PMCID not available [PDF]
- 132. R Tindjong, D G Luchinsky, P V E McClintock, I Kh Kaufman and R S Eisenberg, "Effect of charge fluctuations on the permeation of ions through biological ion channels", in M.Tacano et al. ed. *Noise and Fluctuations, ICNF 2007*, AIP vol. 922, Melville, New York, 2007, pp 647–650. PMCID not available [PDF]
- 133. D G Luchinsky, R Tindjong, I Kaufman, PVE McClintock and RS Eisenberg, Ionic channels as electrostatic amplifiers of charge fluctuations *Electrostatics* 2007, Journal of Physics Conference Series **142** 2008 012049 PMCID not available [PDF]
- 134. Boda, Dezső, 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 PMCID: PMC2292364 [PDF]
- 135. 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

  PMCID: PMC2480679 [PDF] note misprint in middle initial of RSE in print edition.
- 136. Powell, Matthew; Sullivan, Michael; Vlassiouk, 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 PMID: 18654451 [PDF]
- 137. Eisenberg, Bob. (2008). Bubble Gating Currents in Ionic Channels. Posted on https://arxiv.org with Paper ID arXiv:0802.0308v1. PMCID not available [PDF]

- 138. 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. doi: 10.1017/S0956792508007596 PMCID: PMC2756831 [PDF]
- 139. 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. PMCID not available [PDF]
- 140. 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. doi: 10.1016/j.bpj.2008.10.059 PMCID: PMC2717253 [PDF]
- 141. 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. doi: 10.1085/jgp.200910211 PMCID: PMC2712969 [PDF]
- 142. He, Yan, Gillespie, Dirk, Boda, Dezső, Vlassiouk Ivan, Eisenberg, Robert S., and Zuzanna S. Siwy. (2009) Tuning transport properties of nanofluidic devices with local charge inversion. Journal of the American Chemical Society 131 (14), pp 5194–5202. doi: 10.1021/ja808717u PMCID: PMC2714767 [PDF]
- 143. Bardhan, Jaydeep P., Eisenberg, Robert S., and Dirk Gillespie. (2009) Discretization of the Induced-Charge Boundary Integral Equation. Physical Review E. 80, 011906. PMCID: PMC3700357 [PDF]
- 144. 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. <a href="mailto:PMID: 19792169">PMID: 19792169</a> [PDF]
- 145. 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. doi: 10.1016/j.bbamem.2009.09.022 PMCID: PMC2789594 [PDF]
- 146. 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. PMCID not available [PDF]
- 147. 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. doi: 10.1063/1.3357981 PMCID: PMC2856503 [PDF] Posted on https://arxiv.org with Paper ID arXiv:0910.1531.

- 148. 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. PMCID not available [PDF]
- 149. 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). doi: 10.1063/1.3476262 PMCID: PMC2949347 [PDF]
- 150. 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. PMCID not available [PDF]
- 151. 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. doi: 10.1021/jp106760t PMCID: PMC2996618 [PDF] Preprint available on arXiv at https://arxiv.org/abs/1902.09528 [PDF]
- 152. Giri, Janhavi, Fonseca, James. E., Boda, Dezső, Henderson, Douglas, and Eisenberg, Bob. (2011) Self-organized Models of Selectivity in Calcium Channels. Physical Biology **8** 026004. doi: 10.1088/1478-3975/8/2/026004 PMID: 21263167 [PDF]
- 153. 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. doi: 10.1063/1.3532937 PMCID: PMC3045419 [PDF]
- 154. 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. doi: 10.1007/s00249-011-0691-6 PMCID: PMC3124256 PDF
- 155. 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. doi: 10.1063/1.3622857 PMCID: PMC3170393 [PDF]
- 156. Mori, Yoichiro, Liu, Chun, and RS Eisenberg. (2011) A model of electrodiffusion and osmotic water flow and its energetic structure. Physica D: Nonlinear Phonomena 240(22): 1835-1852. PMCID not available [PDF] See early version in the 'Everything Else' section of this Publication List, item 34. Mori, *et al.*
- 157. 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. PMCID not available [PDF]

- 158. Berti, Claudio, Gillespie, Dirk, Eisenberg, Robert S. and Claudio Fiegna. (2011) Particle-based simulation of charge transport in discrete-charge nano-scale systems: the electrostatic problem. Nanoscale Research Letters INEC 2011 Special Issue.

  Nanoscale Res Lett. 2012; 7(1): 135. doi: 10.1186/1556-276X-7-135 PMCID:
  PMC3395871 [PDF]
- 159. 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. PMCID not available [PDF]
- 160. 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 41(3): 259-271. doi: 10.1007/s00249-011-0781-5 PMCID: PMC3288477 [PDF]
- 161. 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 PMCID: PMC3360948 [PDF]
- 162. 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. 11:1240016. PMCID not available [PDF]
- 163. 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. <a href="PMID:23005457">PMID:23005457</a> [PDF]
- 164. 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 116(37): 11422-11441 <a href="http://dx.doi.org/10.1021/jp305273n">http://dx.doi.org/10.1021/jp305273n</a>. <a href="PMID:22900604">PMID:22900604</a> [PDF]
- 165. Kaufman, I., Luchinsky, D.G., Tindjong, R., McClintock, P.V.E., and R.S. Eisenberg. (2013) Multi-ion conduction bands in a simple model of calcium channels. Physical Biology 10 026007 (8pp) Posted on https://arxiv.org with Paper ID <a href="marxiv1209.2381"><u>arXiv1209.2381</u></a> doi: 10.1088/1478-3975/10/2/026007 <a href="marxiv1209.2381"><u>PMID: 23481350</u></a> [PDF]
- 166. Finnerty, Justin, Bob Eisenberg and Paolo Carloni. (2013) Localizing the charged side chains of ion channels within the crowded charge models. Journal of Chemical Theory and Computation J. Chem. Theory Comput. 9, 766-773 10.1021/ct300768j. PMCID not available [PDF]
- 167. Tindjong, R., Kaufman, I., Luchinsky, D.G., McClintock, P.V.E., Khovanov, I., and R.S. Eisenberg. (2013) Non-equilibrium stochastic dynamics of open ion channels. Nonlinear Phenomena in Complex Systems 16(2) 146-161. PMCID not available [PDF]
- 168. Tu, Bin, Chen, Minxin, Xie, Yan, Zhang, Linbo, Eisenberg, Bob, and Benzhuo Lu. (2013) A Parallel Finite Element Simulator for Ion Transport through Three-dimensional Ion Channel Systems. Journal of Computational Chemistry 34:2065-2078. doi: 10.1002/jcc.23329 PMID: 23740647 [PDF]

- 169. Hyon, YunKyong, Bob Eisenberg and Chun Liu. (2013) An energetic variational approach to ion channel dynamics. Mathematical Methods in Applied Sciences DOI: 10.1002/mma.2852. PMCID not available [PDF]
- 170. Liu, Jinn-Liang and Bob Eisenberg. (2013) Correlated Ions in a Calcium Channel Model: A Poisson-Fermi Theory. Journal of Physical Chemistry B 117 (40), 12051-12058. DOI: <a href="http://dx.doi.org/10.1021/jp408330f">http://dx.doi.org/10.1021/jp408330f</a> doi: 10.1021/jp408330f <a href="http://pp408330f">PMID: 24024558</a> <a href="http://ppaper.com/pp408330f">[PDF]</a>
- 171. Tindjong, R., Kaufman, I., Luchinsky, D. G., McClintock P.V.E., Khovanov, I., Eisenberg, R.S. (2013) Self-organized enhancement of conductivity in biological ion channels New J. Phys. 15 p.1-10. PMCID not available [PDF]
- 172. Dreyer, J.; Strodel, P.; Ippoliti, E.; Finnerty, J.; Eisenberg, B.; Carloni, P. (2013) Ion Permeation in the NanC Porin from Escherichia coli: Free Energy Calculations along Pathways Identified by Coarse-Grain Simulations. The Journal of Physical Chemistry B 2013. Available on line with doi: 10.1021/jp4081838 PMID: 24147565 [PDF]
- 173. Kaufman, I., D.G. Luchinsky, R. Tindjong, P.V.E. McClintock, R.S. Eisenberg. (2013) Energetics of discrete selectivity bands and mutation-induced transitions in the calcium-sodium ion channels family. Physical Review E. 88, 052712 (2013) PMID: 24329301 [PDF] Also available at <a href="https://arxiv.org/abs/1305.1847">https://arxiv.org/abs/1305.1847</a>.
- 174. Lin, Tai-Chia, and Bob Eisenberg. (2014) A new approach to the Lennard-Jones potential and a new model: PNP-steric equations. Communications in Mathematical Sciences 12(1) pp. 149–173. PMCID not available [PDF]
- 175. Flavell, Alan, Machen, Michael, Eisenberg, Bob, Kabre, Julienne, Liu, Chun, Li, Xiaofan. (2014) A Conservative Finite Difference Scheme for Poisson-Nernst-Planck Equations Journal of Computational Electronics J Comput Electron (2014) 13:235–249 DOI 10.1007/s10825-013-0506-3. PMCID not available [PDF], also see earlier version posted on https://arxiv.org with Paper ID arXiv 1303.3769v1 [PDF]
- 176. Berti, Claudio, Furini, Simone, Gillespie, Dirk, Boda, Dezso, Eisenberg, Robert S., Sangiorgi, Enrico, and Claudio Fiegna. (2014) Three-Dimensional Brownian Dynamics Simulator for the Study of Ion Permeation through Membrane Pores. JCTC: Journal of Chemical Theory and Computation 10: 2911-2926. dx.doi.org/10.1021/ct4011008 [PDF] and [PDF]. BROWNian Ion channel and Electrolyte Simulator (BROWNIES) is at [PDF].
- 177. Jinn-Liang Liu, Bob Eisenberg. (2014) Analytical Models of Calcium Binding in a Calcium Channel Journal of Chemical Physics 141, 075102 (2014); doi: 10.1063/1.4892839 [PDF]
- 178. Lin, Tai-Chia, Bob Eisenberg. (2014) Multiple solutions of steady-state Poisson-Nernst-Planck equations with steric effects. Published Aug 1, 2014 in https://arxiv.org with Paper ID arXiv:1407.8252v1 [PDF]

- 179. Liu, Jinn-Liang, Bob Eisenberg (2014) Poisson-Nernst-Planck-Fermi Theory for Modeling Biological Ion Channels. Journal of Chemical Physics 141 22D532 doi:http://dx.doi.org/10.1063/1.4902973 [PDF] available on https://arxiv.org with Paper ID in https://arxiv.org with Paper ID arXiv:1506.06203 [PDF]
- 180. Eisenberg, Robert, Liu, Weishi, Xu, Hongguo. (2015). Reversal permanent charge and reversal potential: case studies via classical Poisson-Nernst-Planck models. Nonlinearity 28 (2015) 103–127 doi:10.1088/0951-7715/28/1/103. [PDF]
- 181. Boda, Dezső, Leaf, Gary, Fonseca, Jim, Eisenberg, Bob. (2015) Energetics of ion competition in the DEKA selectivity filter of neuronal sodium channels. Condensed Matter Physics, 18, No 1, 13601: 1–14 [PDF]
- 182. Lin, Tai-Chia, Bob Eisenberg (2015) Multiple solutions of steady-state Poisson-Nernst-Planck equations with steric effects. Nonlinearity 28 2053-2080 [PDF]
- 183. Liu, Jinn-Liang, Bob Eisenberg (2015) Numerical Methods for Poisson-Nernst-Planck-Fermi Model Physical Review E, 92, 012711 [PDF]. Also available on the arXiv as arXiv:1506.05953 [PDF].
- 184. Liu, Jinn-Liang and Bob Eisenberg. (2015) Poisson-Fermi Model of Single Ion Activities in Aqueous Solutions. Chemical Physics Letters, Frontiers Article. 637: p. 1-6. [PDF]. Posted on https://arxiv.org with paper ID arXiv:1506.07780 [PDF]
- 185. Kaufman, I., McClintock, P.V.E, and R.S. Eisenberg. (2015) Coulomb blockade model of permeation and selectivity in biological ion channels. New Journal of Physics 17: 083021 [PDF] with Video Abstract at <a href="https://vimeo.com/133018475">https://vimeo.com/133018475</a> Password is physics
- 186. Kaufman, I., D. G. Luchinsky, W. A. Gibby, P. V.E. McClintock, and R.S. Eisenberg. (2016) Putative resolution of the EEEE selectivity paradox in L-type Ca<sup>2+</sup> and bacterial Na<sup>+</sup> biological ion channels JStat: Journal of Statistical Mechanics: Theory and Experiment doi:10.1088/1742-5468/2016/05/054027. [PDF]
- 187. Liu, Jinn-Liang, Hann-jeng Hsieh and Bob Eisenberg (2016). Poisson–Fermi Modeling of the Ion Exchange Mechanism of the Sodium/Calcium Exchanger. The Journal of Physical Chemistry B 120(10): 2658-2669. [PDF]
- 188. Xie, Dexuan, Jinn-Liang Liu, and Bob Eisenberg (2016). A Nonlocal Poisson-Fermi Model for Ionic Solvent. Available on https://arxiv.org with Paper ID <u>arXiv: 1603.05597</u>. [PDF]
- 189. Xie, Dexuan, Jinn-Liang Liu, Bob Eisenberg, and L. Ridgway Scott (2016). Nonlocal Poisson-Fermi model for ionic solvent. Physical Review E 94 012114 [different version and authorship from ref. 188] [PDF]
- 190. Eisenberg, R. S. (2016). Mass Action and Conservation of Current. Hungarian Journal of Industry and Chemistry 44(1): 1-28 Posted on https://arxiv.org with paper ID arXiv:1502.07251. [PDF]

- 191. Ji, Shuguan, Eisenberg Bob, and Weishi Liu (2017). Flux ratios and channel structure.

  Journal of Dynamics and Differential Equations (JDDE)

  <a href="https://doi.org/10.1007/s10884-017-9607-1">https://doi.org/10.1007/s10884-017-9607-1</a> [PDF] Preprint available on <a href="https://doi.org/10.1007/s10884-017-9607-1">arXiv: 1612.08742</a>. [PDF].
- 192. Kaufman, I. Kh., Fedorenko, O. A., Luchinsky, D.G., Gibby, W.A.T., Roberts, S.K., McClintock, P.V.E., and RS Eisenberg (2017). Ionic Coulomb blockade and anomalous mole fraction effect in NaChBac bacterial ion channels. Nonlinear Biomed. Phys. 5, 4 DOI: 10.1051/epjnbp/2017003 Posted on https://arxiv.org with paper ID <a href="mailto:arXiv:1612.02744">arXiv: 1612.02744</a>. [PDF]
- 193. Liu, Jinn-Liang, Dexuan Xie and Bob Eisenberg (2017). Poisson-Fermi Formulation of Nonlocal Electrostatics in Electrolyte Solutions. Mol. Based Math. Biol. 5:116–124 [PDF]. Posted on https://arxiv.org with arXiv preprint <a href="mailto:arXiv:1703.08290"><u>arXiv:1703.08290</u></a>. [PDF]
- 194. Eisenberg, Bob, Xavier Oriols and David Ferry (2017). Dynamics of Current, Charge, and Mass. Molecular Based Mathematical Biology doi:10.1515/mlbmb-2017-0006 [PDF] and arXiv preprint <a href="https://arxiv.org/abs/1708.07400">https://arxiv.org/abs/1708.07400</a>. [PDF]
- 195. Eisenberg, Bob and Weishi Liu (2017). Relative dielectric constants and selectivity ratios in open ionic channels. Molecular Based Mathematical Biology 5(1)1 125-137 [PDF] available on arXiv at https://arxiv.org as <a href="https://arxiv.org/abs/1710.00090">https://arxiv.org/abs/1710.00090</a>
- 196. Zhang, Liwei, Bob Eisenberg, and Weishi Liu (2017). An effect of large permanent charge: Decreasing flux to zero with increasing transmembrane potential to infinity.

  Available on arXiv as <a href="https://arxiv.org/abs/1712.06666">https://arxiv.org/abs/1712.06666</a> [PDF]
- 197. Liu, Jinn-Liang, and Bob Eisenberg (2018). Poisson-Fermi Modeling of Ion Activities in Aqueous Single and Mixed Electrolyte Solutions at Variable Temperature. Journal of Chemical Physics 148: 054501, DOI: 10.1063/1.5021508. [PDF]

  Available on arXiv at https://arxiv.org in 2017 as arXiv:1801.03470 [PDF]
- 198. Eisenberg, Bob (2018). Asking Biological Questions of Physical Systems: the Device Approach to Emergent Properties. Journal of Molecular Liquids 270: 212 <a href="https://doi.org/10.1016/j.molliq.2018.01.088">https://doi.org/10.1016/j.molliq.2018.01.088</a>, [PDF]. Preprint available on arXiv as <a href="https://arxiv.org/abs/1801.05452">https://arxiv.org/abs/1801.05452</a> [PDF]
- 199. Gavish, Nir, Liu, Chun, and Robert Eisenberg (2018) Do Bi-Stable Steric Poisson-Nernst-Planck Models Describe Single Channel Gating? J. Phys. Chem. B 2018, 122, 5183–5192 (DOI: 10.1021/acs.jpcb.8b00854). [PDF] available on arXiv as https://arxiv.org/abs/1805.06851
- 200. Eisenberg, Bob, Gold, Nathan, Song, Zilong, and Huaxiong Huang. What current flows through a resistor? Available on arXiv as <a href="https://arxiv.org/abs/1805.04814">https://arxiv.org/abs/1805.04814</a> [PDF]
- 201. Shixin, Xu, Bob Eisenberg, Zilong Song, Huaxiong Huang (2018) Osmosis through a Semipermeable Membrane: a Consistent Approach to Interactions. Available on the physics arXiv at <a href="https://arxiv.org/abs/1806.00646">https://arxiv.org/abs/1806.00646</a> [PDF]
- 202. Nissen, Per, and Bob Eisenberg. (2018) Profiles for ion activities are multiphasic, not curvilinear.. Available on the physics arXiv at <a href="https://arxiv.org/abs/1807.07125">https://arxiv.org/abs/1807.07125</a> [PDF]

- 203. X. Yang, Y. Gong, J. Li, R. S. Eisenberg, and Q. Wang, (2019) Quasi-incompressible multispecies ionic fluid Models. J Molecular Liquids 273: 677-691 DOI: 10.1016/j.molliq.2018.10.033 [PDF] available on the physics arXiv as 1811.02665 at <a href="https://arxiv.org/abs/1811.02665">https://arxiv.org/abs/1811.02665</a> [PDF]
- 204. Horng, Tzyy-Leng, Eisenberg, Robert S., Liu, Chun, Bezanilla, Francisco. (2019)
  Continuum gating current models computed with consistent interactions. Biophysical Journal, 116, 270-282 [PDF] Posted in 2017 at https://arxiv.org as preprint arXiv:1707.02566. [PDF]
- 205. Zhu, Yi, Shixin Xu, R.S. Eisenberg, and Huaxiong Huang. (2019) A Bidomain Model for Lens Microcirculation. Biophysical Journal, 116, 1171-1184 [PDF] <a href="https://doi.org/10.1016/j.bpj.2019.02.007">https://doi.org/10.1016/j.bpj.2019.02.007</a>. Preprint available on the physics arXiv at <a href="https://arxiv.org/abs/1810.04162">https://arxiv.org/abs/1810.04162</a> [PDF]
- 206. Eisenberg, Robert S. Dielectric Dilemma. (2019) Available on the physics arXiv at https://arxiv.org/abs/1901.10805 [PDF]

# 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. PMCID not available [PDF]
- 2. †Eisenberg, R.S. and Mathias, R.T. (1980) Structural analysis of electrical properties of cells and tissues. Critical Reviews in Bioengineering 4: 203-232. PMID: 6256125 [PDF]
- 3. Eisenberg, R.S. Structural Complexity, Circuit Models, and Ion Accumulation. (1980) Fed. Proc. 39: 1540-1543. PMID: 7364048 [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. PMCID not available [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. PMCID not available [PDF].
  - (2011) Republished by the American Physiological Society, as part of **Comprehensive Physiology**, Volume 1, Supplement 27 of Handbook of Physiology. Online SSN: 20404603; Online ISBN: 9780470650714. Publisher: Wiley On Line Library. DOI doi:10.1002/cphy.cp100111.
- 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. PMCID not available [PDF]

- 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. PMCID not available [PDF]
- 8. †Eisenberg, R.S. (1987) Impedance measurements as estimators of the properties of the extracellular space. Ann. NY Acad. Sci. 481: 116-122. PMID: 3468851 [PDF]
- 9. <sup>†</sup>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. PMID: 2485003 [PDF]
- 10. †Eisenberg, R.S. (1990) Channels as Enzymes. J. Membrane Biology 115, 1-12 (1990) PMID: 1692343 [PDF]. Also available on arXiv as https://arxiv.org/pdf/1112.2363v2 [PDF]
- 11. <sup>†</sup> 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), 207: 692-9 **Methods in Enzymology**. PMID: 1382208 [PDF]
- 12. <sup>†</sup> 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: 176-181 **Methods in Enzymology**. PMID: 1528117 [PDF]
- 13. <sup>†</sup> 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. PMCID not available [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. PMCID not available [PDF] Published July 5, 2008 in https://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. <a href="PMID: 8699474">PMID: 8699474</a> [PDF] Posted on https://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. PMCID not available [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. PMCID not available [PDF]
- 18. Eisenberg, Bob (1998). Ionic channels in biological membranes. Electrostatic analysis of a natural nanotube. Contemporary Physics, 39 (6) 447-466. PMCID not available [PDF], also available on https://arxiv.org with paper ID arXiv1610.04123

- 19. Nonner, Wolfgang, Chen, Duan, and Bob Eisenberg. (199 9). Progress and prospects in permeation. Journal of General Physiology 113: 773-782. <a href="PMC10: PMC2225611">PMC10: PMC2225611</a> [PDF]
- 20. Eisenberg, R.S. (1999). From Structure to Function in Open Ionic Channels. Journal of Membrane Biology 171 1-24. <a href="PMID: 10485990">PMID: 10485990</a> [PDF] Posted on https://arxiv.org with Paper ID <a href="arXiv: 1011.2939">arXiv: 1011.2939</a>
- 21. Nonner, Wolfgang, and Bob Eisenberg. (2000) Electrodiffusion in Ionic Channels of Biological Membranes. Journal of Molecular Liquids 87:149-162. PMCID not available [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 PMCID not available

  [PDF] Published July 5, 2008 in https://arxiv.org with Paper ID <a href="marxiv:0807.0721">arXiv: 0807.0721</a>.

  [PDF] Original Biophysical Society publication is found at <a href="Original and Original 2">Original 2</a>.
- 23. Eisenberg, R. (2000) Ionic channels: natural nanotubes described by the drift diffusion equations. Superlattices and Microstructures. 27 (5/6) 545-549. PMCID not available [PDF]
- 24. Eisenberg, Bob. (2003) Proteins, Channels, and Crowded Ions Biophysical Chemistry 100: 507 517. [Edsall Memorial Volume] PMCID not available [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!] PMID: 12646387 [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. PMCID not available [PDF]
- 26. Eisenberg, Bob. (2002) Ionic channels as natural nanodevices. J. Computational Electronics 1 331-334. PMCID not available [PDF]
- 27. Eisenberg, Bob. (2003) Ion channels as devices. J. Computational Electronics 2 245-249. PMCID not available [PDF]
- 28. Eisenberg, Bob. (2005) Living Transistors: a Physicist's View of Ion Channels. Posted on https://arxiv.org with Paper ID <a href="mailto:arXiv:q-bio/0506016v2">arXiv:q-bio/0506016v2</a>, June 14, 2005. version 2 August 25, 2005, posted Feb 3 2008. PMCID not available [PDF]. This paper was modified for later publication as: Ions in Fluctuating Channels: Transistors Alive *in* Fluctuation and Noise Letters (2012) 11: 76-96, available on https://arxiv.org with Paper ID <a href="mailto:arXiv:q-bio/0506016v3">arXiv:q-bio/0506016v3</a>, version 3. [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. PMCID not available [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. PMCID not available [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 https://arxiv.org with Paper ID <a href="mailto:arXiv:1009.1786v1">arXiv:1009.1786v1</a>, September 9, 2010. PMCID not available [PDF]
  - Eisenberg, Robert S. (2011) *see paper 5 of* **Reviews** *in this CV*. Republished by the American Physiological Society, as part of **Comprehensive Physiology**, Volume 1, Supplement 27 of Handbook of Physiology. Online SSN: 20404603; Online ISBN: 9780470650714. Publisher: Wiley On Line Library. DOI doi:10.1002/cphy.cp100111.
- 32. Eisenberg, Bob. (2011) Life's Solutions are Not Ideal. Posted on https://arxiv.org with Paper ID arXiv:1105.0184v1, May 3, 2011. PMCID not available [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 PMCID: PMC3142660 Note misprint in address. should be Rush University. [PDF]
- 34. Eisenberg, Bob. (2012) Ions in Fluctuating Channels: Transistors Alive. Fluctuation and Noise Letters. 11:76-96 PMCID not available [PDF] available on https://arxiv.org with Paper ID arXiv:q-bio/0506016v3, i.e., version 3. [PDF] The earlier version is available on http://https://arxiv.org/ as arXiv:q-bio/0506016v2. [PDF]
- 35. 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 <a href="http://https://arxiv.org/abs/1206.1253">http://https://arxiv.org/abs/1206.1253</a> as <a href="http://https://arxiv.org/abs/1206.1253">arXiv:1206.1253v1</a>. PMCID not available [PDF]
- 36. Eisenberg, Bob. (2012) Living Devices. The Physiological Point of View. Available at <a href="http://https://arxiv.org/abs/1206.6490">http://https://arxiv.org/abs/1206.6490</a> as <a href="mailto:arXiv:1206.6490v2">arXiv:1206.6490v2</a>. PMCID not available <a href="mailto:[PDF]">[PDF]</a>
- 37. Eisenberg, Bob. (2012) Life's Solutions. Mathematical Challenge. Available at <a href="http://https://arxiv.org/abs/1207.4737">http://https://arxiv.org/abs/1207.4737</a> as <a href="mailto:arXiv:1207.4737v2">arXiv:1207.4737v2</a>. PMCID not available <a href="PDF">[PDF]</a>
- 38. Eisenberg, Bob. (2012) A Leading Role for Mathematics in the Study of Ionic Solutions. SIAM News, Volume 45, Number 9 (November), p. 12-11 (*sic*). PMCID not available [PDF]
- 39. Eisenberg, Bob. (2013) Ionic Interactions are everywhere. Physiology (a journal of the American Physiological Society) 28:28-38. doi: 10.1152/physiol.00041.2012 PMID: 23280355 [PDF]

- 40. Eisenberg, Bob. (2013) Ionic interactions in biological and physical systems: A variational treatment. Faraday Discussions., 160 (1), 279 296 DOI:10.1039/C2FD20066J Available with significant corrections of typos in equations at <a href="https://arxiv.org/abs/1206.1517">https://arxiv.org/abs/1206.1517</a> as <a href="arXiv:1206.1517v2">arXiv:1206.1517v2</a>. doi:10.1039/C2FD20066J <a href="PMID:23795506">PMID: 23795506</a> [PDF]
- 41. Eisenberg, Bob. (2013) Interacting ions in Biophysics: Real is not ideal.

  Biophysical Journal **104**:1849. doi: 10.1016/j.bpj.2013.03.049 PMCID:

  PMC3647150 [PDF] Also available at https://arxiv.org/abs/1305.2086 as arXiv:1305.2086. [PDF] and at PubMed Central PMC 3647150
- 42. Eisenberg, R. (2015) Single Ion Channels. *In* **Discoveries in Modern Science:**Exploration, Invention, Technology. J. Trefil, editor. Macmillan Reference USA. Farmington Hills, MI. 1006-1010 [PDF]
- 43. Eisenberg, B. (2016) Mass Action and Conservation of Current. HJIC: Hungarian Journal Of Industry And Chemistry 44(1): 1-28 Posted on https://arxiv.org with paper ID <a href="mailto:arXiv:1502.07251">arXiv:1502.07251</a> [PDF]
- 44. Eisenberg, Robert. (2018) Electrical Structure of Biological Cells and Tissues: impedance spectroscopy, stereology, and singular perturbation theory in "Impedance Spectroscopy: Theory, Experiment, and Applications. Third Edition.

  Editors:Evgenij Barsoukov, J. Ross Macdonald, Wiley-Interscience. Ch. 4.7, p. 472-478. Available on arXiv at <a href="https://arxiv.org/abs/1511.01339">https://arxiv.org/abs/1511.01339</a> as <a href="https://arxiv.torg/abs/1511.01339">arXiv:1511.01339</a>.

  [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. PMCID not available
- 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. PMCID not available [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. PMID: 17808485
- 4. Eisenberg, R.S. (1987) Gating Current. **Encyclopedia of Neuroscience**, Birkhauser, Boston, MA, p. 449-450. PMCID not available
- 5. Eisenberg, R.S. (1987) Ionic Channels in Membranes. **Encyclopedia of Neurosciences**. Birkhauser, Boston, MA p. 627-628. PMCID not available
- 6. Eisenberg, R.S. (1987) Structural Complexity in Nerve Cells. **Encyclopedia of Neuroscience**, Birkhauser, Boston, MA, p. 741-742. PMCID not available
- 7. Eisenberg, R.S. (1987) Volumes apart. Nature. Scientific Correspondence on a paper of Zimmerberg and Parsegian. 325: 114. PMCID not available [PDF]

- 8. Eisenberg, R.S. (1990) Complexities in solution. Trends in Biochemical Sciences, 15:51, A Letter concerning a paper of Payne and Rudnick. <a href="PMID: 2336683">PMID: 2336683</a> [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. PMCID not available [PDF]
- 10. Eisenberg, R.S. (1993) Popper, Wolpert, and Critics. Nature 361: 292. PMCID not available [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. PMID: 1439795 [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] <a href="PMCID: PMC1181034">PMCID: PMC1181034</a> [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). PMCID not available [PDF]
- 14. Eisenberg, Bob (2003) Why can't protons move through ion channels? Biophysical Journal 85(6): 3427-3428. PMCID: PMC1303650 [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. 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). PMCID not available [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.) PMCID not available [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. 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). PMCID not available [PDF]
- 18. Eisenberg, Bob (2005). Validating the need to validate code. Physics Today (Letter to the Editor) 58 (8) p. 13. PMCID not available [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. PMCID not available [PDF]

- 20. Eisenberg, Bob (2007). New and Notable: Mechanical Spikes from Nerve Terminals.

  Biophysical Journal 92 p. 2983. doi: 10.1529/biophysj.107.104364 PMCID: PMC1852345 [PDF]
- 21. Eisenberg, R.S. (2007) Look at biological systems through an engineer's eyes. Nature Vol 447, p. 376. PMID: 17522654 [PDF]
- 22. Patent Application, U.S. Patent Application 12/297,179 Mathematical Design of Ion Channel Selectivity via Inverse Problems Technology (with Heinz Engl and Martin Burger, from Rush University Medical Center.) PMCID not available [PDF]
- 23. Eisenberg, Bob. (2008) Understanding Life with Molecular Dynamics and Thermodynamics: Comment on Nature 451, 240-243 (2008). Posted on https://arxiv.org with Paper ID arXiv:0802.2244v2 PMCID not available [PDF]
- 24. Eisenberg, B. (2008) Engineering channels: Atomic biology. Proc. Natl. Acad. Sci. U. S. A. 2008 105: p. 6211-6212. doi: 10.1073/pnas.0802435105 PMCID: PMC2359799 [PDF]
- 25. Eisenberg, B. (2008) Grappling With the Cosmic Questions. Letter to the Editor. New York Times, May 15, p. A30. PMCID not available [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 https://arxiv.org with Paper ID <a href="https://arxiv.org:0807.0838v1">https://arxiv.org:0807.0838v1</a> PMCID not available [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. <a href="http://www.nanohub.org/resources/4726/">http://www.nanohub.org/resources/4726/</a> PMCID not available [PDF]
- 28. Eisenberg, B. (2009) Self organized model of selectivity. Available online from Institute for Mathematics and its Applications (IMA) University of Minnesota at <a href="Self-Organizd IMA link">Self-Organizd IMA link</a> and posted on https://arxiv.org with Paper ID <a href="https://arxiv.org/abs/0906.5173">https://arxiv.org/abs/0906.5173</a> PMCID not available [PDF]
- 29. Eisenberg, B. (2010) Ion Channels and Selectivity. Kavli Institute of Theoretical Physics. University of California Santa Barbara. Seminar Slides on-line at <a href="http://online.kitp.ucsb.edu/online/evocell10/eisenberg">http://online.kitp.ucsb.edu/online/evocell10/eisenberg</a> PMCID not available
- 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 PMCID not available [PDF]
- 31. Eisenberg, Bob. (2010) CSO Deserves Immense Credit. Letter to the Editor, Chicago Tribune, June 4. PMCID not available [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 number 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 149. doi: 10.1063/1.3476262 PMCID: PMC2949347
- 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) <a href="http://www.ima.umn.edu/preprints/jun2010/jun2010.html">http://www.ima.umn.edu/preprints/jun2010/jun2010.html</a> PMCID not available [PDF]
- 34. Mori, Yoichiro, Liu, Chun, and RS Eisenberg. (2010) A Model of Electrodiffusion and Osmotic Water Flow and its Energetic Structure. Posted on https://arxiv.org with Paper ID <a href="https://arxiv.org/abs/1101.5193v1">https://arxiv.org/abs/1101.5193v1</a> PMCID not available [PDF], See final version in the 'Papers' Section of the Publications List, Number 156.
- 35. Eisenberg, Bob. (2012) Reduced Models, Sensitivity, and Inverse Problems. Comment on Paul Krugman Blog of the New York Times. PMCID not available [PDF] <a href="http://krugman.blogs.nytimes.com/2012/03/02/the-microfoundation-thing-wonkish/#postComment">http://krugman.blogs.nytimes.com/2012/03/02/the-microfoundation-thing-wonkish/#postComment</a>
- 36. Eisenberg, Bob. (2013) Electrostatic effects in living cells. Physics Today 66:10-11. PMCID not available [PDF]
- 37. Flavell, Alan, Machen, Michael, Eisenberg, Bob, Liu, Chun, Li, Xiaofan. (2013) A Conservative Finite Difference Scheme for Poisson-Nernst-Planck Equations. Posted on https://arxiv.org with Paper ID\_arXiv:1303.3769v1 [PDF]. See revised published version Flavell, Alan, Machen, Michael, Eisenberg, Bob, Kabre, Julienne, Liu, Chun, Li, Xiaofan. (2013) A Conservative Finite Difference Scheme for Poisson-Nernst-Planck Equations. Jou rnal of Computational Electronics (in the press). PMCID not available [PDF] see item 167, p. 14 of Publications above.
- 38. Kaufman, I., McClintock, P.V.E., and R.S. Eisenberg. (2014) Ionic Coulomb Blockade and Resonant Conduction in Biological Ion Channels. Posted on https://arxiv.org with paper ID <a href="mailto:arXiv:1405.1391">arXiv:1405.1391</a> [PDF]
- 39. Eisenberg, Bob. (2014) Shouldn't we make biochemistry an exact science? Posted on https://arxiv.org with paper ID <u>arXiv:1409.0243</u> [PDF]
- 40. Eisenberg, Bob. (2014) Shouldn't we make biochemistry an exact science? ASBMB Today 13:36-38. [PDF]
- 41. Eisenberg, Bob. (2014) The Right Way to Describe Neuronal Activity? SIAM News December, p. 5. [PDF]
- 42. Eisenberg, Bob. (2016) <u>Interview</u> at Living History website of American Physiological Society: <a href="http://www.the-aps.org/mm/Membership/Living-History/Robert-Eisenberg">http://www.the-aps.org/mm/Membership/Living-History/Robert-Eisenberg</a> or on <a href="YouTube">YouTube</a> at <a href="https://www.youtube.com/watch?v=wj7QiLAv61E">https://www.youtube.com/watch?v=wj7QiLAv61E</a>
- 43. Eisenberg, Bob (2016). Calculus and the Rolling Stones. New York Review of Books, 63(1) January 16, p. [PDF]
- 44. Eisenberg, Bob (2016). Young Socialists turn into Old Democrats. Letter to Editor Chicago Tribune April 16 2016 [PDF]
- 45. Eisenberg, Bob (2016). Electricity is Different, <u>Slides of talk</u> at Penn State Mathematics, August 9, 2016. [PDF<sub>1</sub>] [PDF<sub>2</sub>]

- 46. Eisenberg, Bob (2016). Maxwell Matters.

  Available on arXiv as <a href="https://arxiv.org/abs/1607.06691">https://arxiv.org/abs/1607.06691</a> [PDF]
- 47. Eisenberg, Bob. (2016). Conservation of Charge and Conservation of Current. Available on arXiv as <a href="https://arxiv.org/abs/1609.09175">https://arxiv.org/abs/1609.09175</a> [PDF]
- 48. Eisenberg, Bob. (2017). Conserveration of Current in three and five slides. Presentation DOI: 10.13140/RG.2.2.12662.91207 [PDF] and DOI: 10.13140/RG.2.2.34473.29284 [PDF] published by Research Gate https://www.researchgate.net/ Available on Slideshare and Slideserve.
- 49. Eisenberg, Bob. (2018). Brilliant Stimulation, one cell at a time. Biophysical Journal. New and Notable. 114:256-258. DOI: 10.1016/j.bpj.2017.12.009 [PDF]

### **Recent Lectures:**

Recent lectures are 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.s
- 6. Howell, J., Vaughan, P. and Eisenberg, R.S. (1970) Maintenance of resting potentials in glycerol treated muscle fibers. Biophys. J. 10: 75*a*.
- 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. 195*a*.

- 10. Mobley, B.A., Leung, J. and Eisenberg, R.S. (1974) Longitudinal Impedance of skinned frog muscle fibers. Federation Proceedings 33: 401. PMCID: PMC2203567
- 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: 131*a*.
- 14. Eisenberg, R.S., Barcilon, V. and Mathias, R.T. (1978) Electrical properties of a spherical syncytium. Biophys. J. 21: 48*a*..
- 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: 267a,
- 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: 356a.
- 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: 36a.
- 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: 153a.
- 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: 194a.

- 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: 9a-10a.
- 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: 48*a*.
- 35. Gates, P.Y., Cooper, K.E., and R.S. Eisenberg. (1987) Diffusive flux through ionic channels. Biophys. J. 51: 48*a*.
- 36. Tang, J. M., Wang, J., and R.S. Eisenberg. (1987) Patch clamp of sarcoplasmic reticulum within muscle fibers. Biophys. J. 51: 106*a*.
- 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<sup>+</sup> channel of the sarcoplasmic reticulum. Biophys. J. 53: 151*a*.
- 39. Cooper, K.E., Gates, P.Y., and R.S. Eisenberg. (1988) Diffusion theory and discrete rate constants in ion permeation. Biophys. J. 152a.
- 40. Moghaddamjoo, A., Levis, R.A., and R.S. Eisenberg. (1988). Automatic detection of channel currents. Biophys. J. 153*a*.
- 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<sup>++</sup> channels in the sarcoplasmic reticulum (*SR*) of skinned lobster muscle fibers: patch clamp measurements. J. Cell Biology 107:144**a**.
- 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: 107*P*).
- 44. J. Wang, J.M. Tang, and R.S. Eisenberg. Ca<sup>++</sup> channels from sarcoplasmic reticulum of split lobster muscle fibers. (1989) Biophysical J. 55: 207*a*.
- 45. A. Hainsworth, R.A. Levis, and R.S. Eisenberg. (1989) Excess open-channel noise in the SR K<sup>+</sup> channel. Biophysical J. 55: 200*a*.
- 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: 171*a*.

- 48. J.M. Tang, J. Wang, T. Lea and Eisenberg, R.S. (1990) Contractures and reloading in skinned lobster muscle fibers. Biophys. J. 57: 171*a*.
- 49. R.S. Eisenberg, J.M. Tang, and J. Wang. (1991) Ionic channels of the sarcoplasmic reticulum of lobster remotor muscle. Biophys. J. 59: 177*a*.
- 50. D.P. Chen and R.S. Eisenberg. (1991) Constant fields and constant gradients in open ionic channels. Biophys. J. 59: 404*a*.
- 51. R.S. Eisenberg, D.P. Chen, and V. Barcilon. (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, Barcilon, 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. [PDF]
- 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. [PDF<sub>1</sub>] [PDF<sub>2</sub>]
- 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. 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. [PDF]
- 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. Aguilella-Arzo, Marcel, Garcia-Celma, Juan, Aguilella, Vicente, and Robert Eisenberg. (2004) Computing numerically access resistance of a channel. Biophysical Journal 86 629a.
- 96. Peyser, Alexander, Nonner, Wofgang 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  $Ca^{2+}$  from  $Na^+$  ? 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 Board [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, Kattrin, 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, Vlassiouk, 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 Board [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 Board [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 Board [PDF] Other versions available at Institute of Mathematics and its Applications IMA, University of Minnesota, Self-Organized IMA link and on the https://arxiv.org with Paper ID <a href="marxiv:0906.5173">arXiv:0906.5173</a>
- 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 Board 461 [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 Board 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+ channel. Volume 98 pp. 117a Abstract [PDF] and Poster Board 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 Board 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 Board 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 Board 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. Volume100 (3): p. 187a. Abstract [PDF] and Platform 1025 [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 Liu. (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, Dezsö 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]
- 129. Ryham, R. J., M. A. Ward, R. S. Eisenberg, and F. S. Cohen. (2013) Calculating Minimal Energy Shapes of Fusion Pores. Biophysical Journal 104:91a-92a. Abstract 479-Pos [PDF] and Poster Board B248 [PDF]
- 130. Berti, C., D. Gillespie, D. Boda, B. Eisenberg, and C. Fiegna. (2013) Brownian Dynamics Study of Current and Selectivity of Calcium Channels. Biophysical Journal 104:102a-103a. Abstract 533-Pos [PDF] Poster Board B302 [PDF]
- 131. Eisenberg, R. S., I. Kaufman, D. Luchinsky, R. Tindjong, and P. V. E. McClintock. (2013)
  Discrete Conductance Levels in Calcium Channel Models: Multiband Calcium
  Selective Conduction. Biophysical Journal 104:358a. [PDF] Platform 1836 [PDF]
- 132. Eisenberg, B., T.-L. Horng, T.-C. Lin, and C. Liu. (2013) Steric PNP (Poisson-Nernst-Planck): Ions in Channels. Biophysical Journal 104:509a. Abstract 2605 [PDF]; Poster Board B624 [PDF]
- 133. Luchinsky, Dmitry G., Tindjong, Rodrigue, Kaufman, Igor, McClintock, Peter V. E., Khovanov Igor A., Eisenberg, Bob. (2014) Observation Of "Remote Knock-On", A New Permeation-Enhancement Mechanism In Ion Channels. Biophysical Journal 106:133a; Abstract 684 [PDF]; Poster Board B439 [PDF]
- 134. Eisenberg, B. and Liu, Jinn-Liang. (2014) Poisson-Fermi Model of a Calcium Channel: correlations and dielectric coefficient are computed outputs, Biophysical Journal 106:133a-134a; Abstract 686 [PDF]; Poster Board B441 [PDF]

- 135. Eisenberg, B. (2015) Rate constant models cannot describe movement of charged atoms or molecules. Biophysical Journal 108:577a; Abstract 2920 [PDF]; Poster Board B350 [PDF]
- 136. Kaufman, Igor, Gibby, William, Dmitri G. Luchinsky, Dmitri, McClintock, Peter V.E. and Robert S. Eisenberg. (2015) Coulomb blockade model of permeation in biological ion channels Biophysical Late Abstract L3552, [PDF]; Poster Board LB34 [PDF] *N.B. Late abstracts are not published.*
- 137. Eisenberg, R. and J.L. Liu (2015) Poisson Fermi model of the ion exchange mechanism of the sodium/calcium exchanger NCX. Neurosciences Meeting October 2015 Presentation Number: 450.09 [PDF] of Abstract] Poster Board Number: DD28 [PDF] of Poster]
- 138. Horng, Tzyy-Leng, Eisenberg, Robert S., Liu, Chun, Bezanilla, Francisco. (2016). Gating current models computed with consistent interactions. Biophysical Journal 110: 102a-103a [PDF of Abstract] Poster 528; Poster Board B308 [PDF of Poster]
- 139. Liu, Jinn-Liang, Eisenberg, Bob. (2016). Binding sites of the Ca/Na Exchanger NCX analyzed with Poisson Fermi theory. Biophysical Journal 110: 260a [PDF] of Abstract] Poster 1293; Pos Board B270 [PDF] of Poster]
- 140. Gibby, William A.T., Luchinsky, Dmitri G., Kaufman, Igor Kh, McClintock, Peter V.E., Stefanovska, Aneta Eisenberg, Robert S (2016). Insights into Ion Channel Selectivity with Ionic Coulomb Blockade Biophysical Journal, 110: p343a 1693-Plat [PDF] of Abstract]
- 141. Luchinsky, Dmitri G., Gibby, Will, Kaufman, Igor Kh, , Dmitri, Eisenberg, Robert S., McClintock, Peter V.E. (2016) On the conductivity and selectivity paradox Biophysical Late Abstract L3306, [PDF]; Poster Board LB66 N.B. Late abstracts are not published.

[Laboratory of Robert S. Eisenberg]