

Francisco Bezanilla

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133 papers	11,475 citations	50 h-index	106 g-index
146 ext. papers	12,796 ext. citations	10.4 avg, IF	6.54 L-index

#	Paper	IF	Citations
133	The voltage sensor in voltage-dependent ion channels. <i>Physiological Reviews</i> , 2000 , 80, 555-92	47.9	721
132	Charge movement associated with the opening and closing of the activation gates of the Na channels. <i>Journal of General Physiology</i> , 1974 , 63, 533-52	3.4	644
131	Voltage-sensing residues in the S2 and S4 segments of the Shaker K ⁺ channel. <i>Neuron</i> , 1996 , 16, 1159-67	13.9	593
130	Currents related to movement of the gating particles of the sodium channels. <i>Nature</i> , 1973 , 242, 459-61	50.4	559
129	Destruction of sodium conductance inactivation in squid axons perfused with pronase. <i>Journal of General Physiology</i> , 1973 , 62, 375-91	3.4	476
128	Atomic scale movement of the voltage-sensing region in a potassium channel measured via spectroscopy. <i>Nature</i> , 1999 , 402, 809-13	50.4	438
127	Infrared light excites cells by changing their electrical capacitance. <i>Nature Communications</i> , 2012 , 3, 736	17.4	375
126	How membrane proteins sense voltage. <i>Nature Reviews Molecular Cell Biology</i> , 2008 , 9, 323-32	48.7	357
125	A proton pore in a potassium channel voltage sensor reveals a focused electric field. <i>Nature</i> , 2004 , 427, 548-53	50.4	335
124	Characterizing voltage-dependent conformational changes in the Shaker K ⁺ channel with fluorescence. <i>Neuron</i> , 1997 , 19, 1127-40	13.9	295
123	Gating currents from a nonconducting mutant reveal open-closed conformations in Shaker K ⁺ channels. <i>Neuron</i> , 1993 , 11, 353-8	13.9	274
122	Tracking voltage-dependent conformational changes in skeletal muscle sodium channel during activation. <i>Journal of General Physiology</i> , 2002 , 120, 629-45	3.4	255
121	Voltage sensors in domains III and IV, but not I and II, are immobilized by Na ⁺ channel fast inactivation. <i>Neuron</i> , 1999 , 22, 73-87	13.9	235
120	Gating charge displacement in voltage-gated ion channels involves limited transmembrane movement. <i>Nature</i> , 2005 , 436, 852-6	50.4	226
119	Photosensitivity of neurons enabled by cell-targeted gold nanoparticles. <i>Neuron</i> , 2015 , 86, 207-17	13.9	221
118	Histidine scanning mutagenesis of basic residues of the S4 segment of the shaker k ⁺ channel. <i>Journal of General Physiology</i> , 2001 , 117, 469-90	3.4	205
117	Voltage-dependent proton transport by the voltage sensor of the Shaker K ⁺ channel. <i>Neuron</i> , 1997 , 19, 1319-27	13.9	202

116	S4-based voltage sensors have three major conformations. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2008 , 105, 17600-7	11.5	170
115	Small vertical movement of a K ⁺ channel voltage sensor measured with luminescence energy transfer. <i>Nature</i> , 2005 , 436, 848-51	50.4	169
114	Correlation between charge movement and ionic current during slow inactivation in Shaker K ⁺ channels. <i>Journal of General Physiology</i> , 1997 , 110, 579-89	3.4	164
113	Two atomic constraints unambiguously position the S4 segment relative to S1 and S2 segments in the closed state of Shaker K channel. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2007 , 104, 7904-9	11.5	145
112	An emerging consensus on voltage-dependent gating from computational modeling and molecular dynamics simulations. <i>Journal of General Physiology</i> , 2012 , 140, 587-94	3.4	141
111	Three distinct and sequential steps in the release of sodium ions by the Na ⁺ /K ⁺ -ATPase. <i>Nature</i> , 2000 , 403, 898-901	50.4	133
110	Domain IV voltage-sensor movement is both sufficient and rate limiting for fast inactivation in sodium channels. <i>Journal of General Physiology</i> , 2013 , 142, 101-12	3.4	130
109	Movement of T _g gating charge T _{is} coupled to ligand binding in a G-protein-coupled receptor. <i>Nature</i> , 2006 , 444, 106-9	50.4	129
108	Cut-open oocyte voltage-clamp technique. <i>Methods in Enzymology</i> , 1998 , 293, 300-18	1.7	127
107	Photoelectrochemical modulation of neuronal activity with free-standing coaxial silicon nanowires. <i>Nature Nanotechnology</i> , 2018 , 13, 260-266	28.7	124
106	Structural implications of fluorescence quenching in the Shaker K ⁺ channel. <i>Journal of General Physiology</i> , 1998 , 112, 391-408	3.4	124
105	A fluorometric approach to local electric field measurements in a voltage-gated ion channel. <i>Neuron</i> , 2003 , 37, 85-97	13.9	107
104	Total charge movement per channel. The relation between gating charge displacement and the voltage sensitivity of activation. <i>Journal of General Physiology</i> , 1997 , 109, 27-39	3.4	101
103	Heterogeneous silicon mesostructures for lipid-supported bioelectric interfaces. <i>Nature Materials</i> , 2016 , 15, 1023-30	27	99
102	Voltage-gated ion channels. <i>IEEE Transactions on Nanobioscience</i> , 2005 , 4, 34-48	3.4	95
101	Coupling interactions between voltage sensors of the sodium channel as revealed by site-specific measurements. <i>Journal of General Physiology</i> , 2004 , 123, 217-30	3.4	90
100	Detection of the opening of the bundle crossing in KcsA with fluorescence lifetime spectroscopy reveals the existence of two gates for ion conduction. <i>Journal of General Physiology</i> , 2006 , 128, 569-81	3.4	87
99	Alpha-scorpion toxin impairs a conformational change that leads to fast inactivation of muscle sodium channels. <i>Journal of General Physiology</i> , 2008 , 132, 251-63	3.4	82

98	An atlas of nano-enabled neural interfaces. <i>Nature Nanotechnology</i> , 2019 , 14, 645-657	28.7	80
97	Gating of the bacterial sodium channel, NaChBac: voltage-dependent charge movement and gating currents. <i>Journal of General Physiology</i> , 2004 , 124, 349-56	3.4	79
96	In search of a consensus model of the resting state of a voltage-sensing domain. <i>Neuron</i> , 2011 , 72, 713-20	3.9	78
95	Voltage gating of Shaker K ⁺ channels. The effect of temperature on ionic and gating currents. <i>Journal of General Physiology</i> , 1998 , 112, 223-42	3.4	78
94	A fluorophore attached to nicotinic acetylcholine receptor beta M2 detects productive binding of agonist to the alpha delta site. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2004 , 101, 10195-200	11.5	75
93	Modulation of the Shaker K(+) channel gating kinetics by the S3-S4 linker. <i>Journal of General Physiology</i> , 2000 , 115, 193-208	3.4	68
92	beta-Scorpion toxin modifies gating transitions in all four voltage sensors of the sodium channel. <i>Journal of General Physiology</i> , 2007 , 130, 257-68	3.4	67
91	Gating currents associated with potassium channel activation. <i>Nature</i> , 1982 , 296, 657-9	50.4	64
90	KramersDiffusion theory applied to gating kinetics of voltage-dependent ion channels. <i>Biophysical Journal</i> , 1999 , 76, 782-803	2.9	62
89	Fast gating in the Shaker K ⁺ channel and the energy landscape of activation. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2003 , 100, 7611-5	11.5	60
88	Ion channels: from conductance to structure. <i>Neuron</i> , 2008 , 60, 456-68	13.9	56
87	Coupling between the voltage-sensing and phosphatase domains of Ci-VSP. <i>Journal of General Physiology</i> , 2009 , 134, 5-14	3.4	55
86	A common pathway for charge transport through voltage-sensing domains. <i>Neuron</i> , 2008 , 57, 345-51	13.9	54
85	Resting state of the human proton channel dimer in a lipid bilayer. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2015 , 112, E5926-35	11.5	51
84	Control of a final gating charge transition by a hydrophobic residue in the S2 segment of a K ⁺ channel voltage sensor. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2011 , 108, 6444-9	11.5	50
83	Charge movement of a voltage-sensitive fluorescent protein. <i>Biophysical Journal</i> , 2009 , 96, L19-21	2.9	49
82	Detecting rearrangements of shaker and NaChBac in real-time with fluorescence spectroscopy in patch-clamped mammalian cells. <i>Biophysical Journal</i> , 2004 , 86, 3966-80	2.9	48
81	Sodium and potassium conductance changes during a membrane action potential. <i>Journal of Physiology</i> , 1970 , 211, 729-51	3.9	47

80	Moving gating charges through the gating pore in a Kv channel voltage sensor. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2014 , 111, E1950-9	11.5	46
79	IKs channels open slowly because KCNE1 accessory subunits slow the movement of S4 voltage sensors in KCNQ1 pore-forming subunits. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2013 , 110, E559-66	11.5	45
78	Molecular bases for the asynchronous activation of sodium and potassium channels required for nerve impulse generation. <i>Neuron</i> , 2013 , 79, 651-7	13.9	44
77	In vivo measurement of intramolecular distances using genetically encoded reporters. <i>Biophysical Journal</i> , 2007 , 93, L45-7	2.9	44
76	Intermediate state trapping of a voltage sensor. <i>Journal of General Physiology</i> , 2012 , 140, 635-52	3.4	43
75	Ouabain binding site in a functioning Na ⁺ /K ⁺ ATPase. <i>Journal of Biological Chemistry</i> , 2011 , 286, 38177-38183	3.4	43
74	Fluorescence detection of the movement of single KcsA subunits reveals cooperativity. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2008 , 105, 20263-8	11.5	43
73	Optocapacitive Generation of Action Potentials by Microsecond Laser Pulses of Nanojoule Energy. <i>Biophysical Journal</i> , 2018 , 114, 283-288	2.9	42
72	The dynamic relationships between the three events that release individual Na ⁺ ions from the Na ⁺ /K ⁺ -ATPase. <i>Nature Communications</i> , 2012 , 3, 669	17.4	42
71	Extracellular Mg(2+) modulates slow gating transitions and the opening of Drosophila ether- ∇ Go-Go potassium channels. <i>Journal of General Physiology</i> , 2000 , 115, 319-38	3.4	42
70	Molecular mechanism of Mg2+-dependent gating in CorA. <i>Nature Communications</i> , 2014 , 5, 3590	17.4	39
69	Gating currents. <i>Journal of General Physiology</i> , 2018 , 150, 911-932	3.4	39
68	Properties of deactivation gating currents in Shaker channels. <i>Biophysical Journal</i> , 2011 , 100, L28-30	2.9	37
67	A physical model of potassium channel activation: from energy landscape to gating kinetics. <i>Biophysical Journal</i> , 2003 , 84, 3703-16	2.9	37
66	Mechanism of potassium ion uptake by the Na(+)/K(+)-ATPase. <i>Nature Communications</i> , 2015 , 6, 7622	17.4	36
65	Perturbation analysis of the voltage-sensitive conformational changes of the Na ⁺ /glucose cotransporter. <i>Journal of General Physiology</i> , 2005 , 125, 13-36	3.4	36
64	A comparison of propagated action potentials from tropical and temperate squid axons: different durations and conduction velocities correlate with ionic conductance levels. <i>Journal of Experimental Biology</i> , 2002 , 205, 1819-1830	3	36
63	Nongenetic optical neuromodulation with silicon-based materials. <i>Nature Protocols</i> , 2019 , 14, 1339-1376	18.8	35

62	Real-time imaging of electrical signals with an infrared FDA-approved dye. <i>Biophysical Journal</i> , 2014 , 107, L09-12	2.9	35
61	Distance measurements reveal a common topology of prokaryotic voltage-gated ion channels in the lipid bilayer. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2006 , 103, 15865-70	11.5	35
60	Molecular mechanism for depolarization-induced modulation of Kv channel closure. <i>Journal of General Physiology</i> , 2012 , 140, 481-93	3.4	34
59	Fluorescence changes during electrical activity in frog muscle stained with merocyanine. <i>Nature</i> , 1976 , 259, 684-6	50.4	34
58	Roadmap on semiconductor-cell biointerfaces. <i>Physical Biology</i> , 2018 , 15, 031002	3	34
57	The gating charge should not be estimated by fitting a two-state model to a Q-V curve. <i>Journal of General Physiology</i> , 2013 , 142, 575-8	3.4	32
56	Optical detection of rate-determining ion-modulated conformational changes of the ether-go-go K ⁺ channel voltage sensor. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2005 , 102, 18718-23	11.5	32
55	Depolarization induces a conformational change in the binding site region of the M2 muscarinic receptor. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2012 , 109, 285-90	11.5	30
54	Mapping of voltage sensor positions in resting and inactivated mammalian sodium channels by LRET. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2017 , 114, E1857-E1865	11.5	29
53	Loss-of-function BK channel mutation causes impaired mitochondria and progressive cerebellar ataxia. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2020 , 117, 6023-6034	11.5	29
52	The voltage sensor and the gate in ion channels. <i>Advances in Protein Chemistry</i> , 2003 , 63, 211-41		29
51	Kv3.1 uses a timely resurgent K(+) current to secure action potential repolarization. <i>Nature Communications</i> , 2015 , 6, 10173	17.4	28
50	Gating currents from Kv7 channels carrying neuronal hyperexcitability mutations in the voltage-sensing domain. <i>Biophysical Journal</i> , 2012 , 102, 1372-82	2.9	28
49	Sensing charges of the Ciona intestinalis voltage-sensing phosphatase. <i>Journal of General Physiology</i> , 2013 , 142, 543-55	3.4	28
48	Single-molecule fluorimetry and gating currents inspire an improved optical voltage indicator. <i>ELife</i> , 2015 , 4, e10482	8.9	26
47	A Novel Voltage Sensor in the Orthosteric Binding Site of the M2 Muscarinic Receptor. <i>Biophysical Journal</i> , 2016 , 111, 1396-1408	2.9	26
46	S3-S4 linker length modulates the relaxed state of a voltage-gated potassium channel. <i>Biophysical Journal</i> , 2013 , 105, 2312-22	2.9	25
45	Gating currents from neuronal KV7.4 Channels: General features and correlation with the ionic conductance. <i>Channels</i> , 2009 , 3, 277-286	3	25

44	Total chemical synthesis of biologically active fluorescent dye-labeled Ts1 toxin. <i>Angewandte Chemie - International Edition</i> , 2014 , 53, 8970-4	16.4	24
43	Structural biology. Force and voltage sensors in one structure. <i>Science</i> , 2002 , 298, 1562-3	33.3	23
42	Time course of the sodium influx in squid giant axon during a single voltage clamp pulse. <i>Journal of Physiology</i> , 1970 , 207, 151-64	3.9	21
41	The action potential: from voltage-gated conductances to molecular structures. <i>Biological Research</i> , 2006 , 39, 425-35	7.6	21
40	Development of a PET radioligand for potassium channels to image CNS demyelination. <i>Scientific Reports</i> , 2018 , 8, 607	4.9	20
39	Probing E(10) transitions in a voltage-sensing S4 helix. <i>Biophysical Journal</i> , 2014 , 107, 1117-1128	2.9	20
38	Fluorescence techniques for studying cloned channels and transporters expressed in <i>Xenopus</i> oocytes. <i>Methods in Enzymology</i> , 1998 , 296, 566-78	1.7	20
37	Remote nongenetic optical modulation of neuronal activity using fuzzy graphene. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2020 , 117, 13339-13349	11.5	19
36	Thermal mechanisms of millimeter wave stimulation of excitable cells. <i>Biophysical Journal</i> , 2013 , 104, 2622-8	2.9	19
35	Cholesterol Functionalization of Gold Nanoparticles Enhances Photoactivation of Neural Activity. <i>ACS Chemical Neuroscience</i> , 2019 , 10, 1478-1487	5.7	18
34	Tuning the voltage-sensor motion with a single residue. <i>Biophysical Journal</i> , 2012 , 103, L23-L25	2.9	17
33	Functional Site-Directed Fluorometry. <i>Advances in Experimental Medicine and Biology</i> , 2015 , 869, 55-76	3.6	16
32	Noncanonical mechanism of voltage sensor coupling to pore revealed by tandem dimers of Shaker. <i>Nature Communications</i> , 2019 , 10, 3584	17.4	15
31	Demonstration of ion channel synthesis by isolated squid giant axon provides functional evidence for localized axonal membrane protein translation. <i>Scientific Reports</i> , 2018 , 8, 2207	4.9	14
30	Energy landscape of the reactions governing the Na ⁺ deeply occluded state of the Na ⁺ /K ⁺ -ATPase in the giant axon of the Humboldt squid. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2011 , 108, 20556-61	11.5	14
29	Nano-positioning system for structural analysis of functional homomeric proteins in multiple conformations. <i>Structure</i> , 2012 , 20, 1629-40	5.2	13
28	Elucidation of the Covalent and Tertiary Structures of Biologically Active Ts3 Toxin. <i>Angewandte Chemie - International Edition</i> , 2016 , 55, 8639-42	16.4	13
27	α -subunit-induced structural rearrangements of the Ca ²⁺ - and voltage-activated K ⁺ (BK) channel. <i>Proceedings of the National Academy of Sciences of the United States of America</i> , 2016 , 113, E3231-9	11.5	13

26	Inversion of the Side-Chain Stereochemistry of Individual Thr or Ile Residues in a Protein Molecule: Impact on the Folding, Stability, and Structure of the ShK Toxin. <i>Angewandte Chemie - International Edition</i> , 2017 , 56, 3324-3328	16.4	12
25	Replacing voltage sensor arginines with citrulline provides mechanistic insight into charge versus shape. <i>Journal of General Physiology</i> , 2018 , 150, 1017-1024	3.4	11
24	Nonsensing residues in S3-S4 linker's C terminus affect the voltage sensor set point in K channels. <i>Journal of General Physiology</i> , 2018 , 150, 307-321	3.4	10
23	Biophysical Characterization of Genetically Encoded Voltage Sensor ASAP1: Dynamic Range Improvement. <i>Biophysical Journal</i> , 2017 , 113, 2178-2181	2.9	10
22	A structural rearrangement of the Na ⁺ /K ⁺ -ATPase traps ouabain within the external ion permeation pathway. <i>Journal of Molecular Biology</i> , 2015 , 427, 1335-1344	6.5	10
21	Time course of the sodium permeability change during a single membrane action potential. <i>Journal of Physiology</i> , 1970 , 211, 753-65	3.9	10
20	10. Voltage Clamping of Excitable Membranes. <i>Methods in Experimental Physics</i> , 1982 , 20, 445-511		10
19	Transient Electrical Currents Mediated by the Na/K-ATPase: A Tour from Basic Biophysics to Human Diseases. <i>Biophysical Journal</i> , 2020 , 119, 236-242	2.9	8
18	Molecular basis for functional connectivity between the voltage sensor and the selectivity filter gate in K channels. <i>ELife</i> , 2021 , 10,	8.9	7
17	Mechanism of functional interaction between potassium channel Kv1.3 and sodium channel NavBeta1 subunit. <i>Scientific Reports</i> , 2017 , 7, 45310	4.9	6
16	Determination of the Stoichiometry between α and β Subunits of the BK Channel Using LRET. <i>Biophysical Journal</i> , 2018 , 114, 2493-2497	2.9	6
15	Nav channel binder containing a specific conjugation-site based on a low toxicity β -scorpion toxin. <i>Scientific Reports</i> , 2017 , 7, 16329	4.9	6
14	Continuum Gating Current Models Computed with Consistent Interactions. <i>Biophysical Journal</i> , 2019 , 116, 270-282	2.9	6
13	Methodological improvements for fluorescence recordings in oocytes. <i>Journal of General Physiology</i> , 2019 , 151, 264-272	3.4	5
12	Influences: The Cell Physiology Laboratory in Montemar, Chile. <i>Journal of General Physiology</i> , 2018 , 150, 1464-1468	3.4	4
11	Correspondence: Reply to 'Revisiting the theoretical cell membrane thermal capacitance response' <i>Nature Communications</i> , 2017 , 8, 1432	17.4	3
10	LRET Determination of Molecular Distances during pH Gating of the Mammalian Inward Rectifier Kir1.1b. <i>Biophysical Journal</i> , 2018 , 114, 88-97	2.9	3
9	Non-Canonical Interactions between Voltage Sensors and Pore Domain in Shaker K ⁺ -Channel. <i>Biophysical Journal</i> , 2017 , 112, 162a	2.9	2

8	Gating Current Models Computed with Consistent Interactions. <i>Biophysical Journal</i> , 2016 , 110, 102a-103a.9	2
7	Metal Bridge in S4 Segment Supports Helix Transition in Shaker Channel. <i>Biophysical Journal</i> , 2020 , 118, 922-933	2.9 2
6	Voltage-Gated Ion Channels: The Machines Responsible for the Nerve Impulse 2011 , 231-248	1
5	Experimental challenges in ion channel research: uncovering basic principles of permeation and gating in potassium channels. <i>Advances in Physics: X</i> , 2022 , 7,	5.1 1
4	Voltage Dependent Conductances: Gating Currents and Single Channel Recordings 1991 , 39-56	1
3	Gating current noise produced by Brownian models of a voltage sensor. <i>Biophysical Journal</i> , 2021 , 120, 3983-4001	2.9 0
2	Optocapacitance: physical basis and its application.. <i>Biophysical Reviews</i> , 2022 , 14, 569-577	3.7 0
1	Optocapacitance Allows for Photostimulation of Neurons without Requiring Genetic Modification. <i>Neuromethods</i> , 2018 , 1-13	0.4