Bin Gao

List of Publications by Year
in descending order

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140 papers	9,723 citations	66343 42 h-index	43889 91 g-index
145 all docs	145 docs citations	145 times ranked	6131 citing authors

#	Article	IF	Citations
1	A Memristorsâ€Based Dendritic NeuronÂfor Highâ€Efficiency Spatialâ€Temporal Information Processing. Advanced Materials, 2023, 35, .	21.0	18
2	Complementary Memtransistor-Based Multilayer Neural Networks for Online Supervised Learning Through (Anti-)Spike-Timing-Dependent Plasticity. IEEE Transactions on Neural Networks and Learning Systems, 2022, 33, 6640-6651.	11.3	4
3	Application of mathematical morphology operation with memristor-based computation-in-memory architecture for detecting manufacturing defects. Fundamental Research, 2022, 2, 123-130.	3.3	5
4	A Unified PUF and TRNG Design Based on 40-nm RRAM With High Entropy and Robustness for IoT Security. IEEE Transactions on Electron Devices, 2022, 69, 536-542.	3.0	26
5	Trends and challenges in the circuit and macro of RRAM-based computing-in-memory systems. , 2022, 1, 100004.		12
6	Rotating neurons for all-analog implementation of cyclic reservoir computing. Nature Communications, 2022, 13, 1549.	12.8	44
7	Investigation of Resistive Switching Mechanisms in Ti/TiO_x/Pdâ€Based RRAM Devices. Advanced Electronic Materials, 2022, 8, .	5.1	12
8	Memristor-based analogue computing for brain-inspired sound localization with in situ training. Nature Communications, 2022, 13, 2026.	12.8	42
9	The Impact of Thermal Enhance Layers on the Relaxation Effect in Analog RRAM. IEEE Transactions on Electron Devices, 2022, 69, 4254-4258.	3.0	10
10	Pt/TiO_x/Ti-based Dynamic Optoelectronic Memristor for Neuromorphic Computing. , 2022, , .		2
11	Real-Time-Scale 3D Kinetic Monte Carlo Simulation for Hafnium Oxide Based RRAM in 1T1R Cell. , 2022, , .		0
12	Concealable physically unclonable function chip with a memristor array. Science Advances, 2022, 8, .	10.3	27
13	In-memory Learning with Analog Resistive Switching Memory: A Review and Perspective. Proceedings of the IEEE, 2021, 109, 14-42.	21.3	96
14	Diagonal Matrix Regression Layer: Training Neural Networks on Resistive Crossbars With Interconnect Resistance Effect. IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, 2021, 40, 1662-1671.	2.7	15
15	RRAM Device Characterizations and Modelling. , 2021, , 345-381.		0
16	Dynamic memristor-based reservoir computing for high-efficiency temporal signal processing. Nature Communications, 2021, 12, 408.	12.8	231
17	An On-chip Layer-wise Training Method for RRAM based Computing-in-memory Chips. , 2021, , .		5
18	A Compact Model of Analog RRAM Considering Temperature Coefficient for Neural Network Evaluation. , 2021, , .		3

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19	Array-level boosting method with spatial extended allocation to improve the accuracy of memristor based computing-in-memory chips. Science China Information Sciences, 2021, 64, 1.	4.3	13
20	Identifying relaxation and random telegraph noises in filamentary analog RRAM for neuromorphic computing. , 2021, , .		3
21	A Compact Model for Relaxation Effect in Analog RRAM for Computation-in-Memory System Design and Benchmark. , 2021, , .		3
22	Neuronal Firing Characteristics in the NbO₂ based Mott Memristor. , 2021, , .		1
23	Recent progress of integrated circuits and optoelectronic chips. Science China Information Sciences, 2021, 64, 1.	4.3	56
24	A Highly Reliable RRAM Physically Unclonable Function Utilizing Post-Process Randomness Source. IEEE Journal of Solid-State Circuits, 2021, 56, 1641-1650.	5.4	32
25	Oscillation neuron based on a low-variability threshold switching device for high-performance neuromorphic computing. Journal of Semiconductors, 2021, 42, 064101.	3.7	8
26	Compact Reliability Model of Analog RRAM for Computation-in-Memory Device-to-System Codesign and Benchmark. IEEE Transactions on Electron Devices, 2021, 68, 2686-2692.	3.0	9
27	Analog memristive synapse based on topotactic phase transition for high-performance neuromorphic computing and neural network pruning. Science Advances, 2021, 7, .	10.3	63
28	Crossbar-Level Retention Characterization in Analog RRAM Array-Based Computation-in-Memory System. IEEE Transactions on Electron Devices, 2021, 68, 3813-3818.	3.0	8
29	Cryogenic HfOâ,“-Based Resistive Memory With a Thermal Enhancement Capping Layer. IEEE Electron Device Letters, 2021, 42, 1276-1279.	3.9	12
30	Oxide-based filamentary RRAM for deep learning. Journal Physics D: Applied Physics, 2021, 54, 083002.	2.8	20
31	System and Technology Co-optimization for RRAM based Computation-in-memory Chip. , 2021, , .		1
32	Forming-free and Annealing-free V/VO_x/HfWO_x/Pt Device Exhibiting Reconfigurable Threshold and Resistive switching with high speed (<30ns) and high endurance (>10¹²/>10¹⁰). , 2021, , .		6
33	An Improved RRAM-Based Binarized Neural Network With High Variation-Tolerated Forward/Backward Propagation Module. IEEE Transactions on Electron Devices, 2020, 67, 469-473.	3.0	14
34	Reliability of analog resistive switching memory for neuromorphic computing. Applied Physics Reviews, 2020, 7, .	11.3	199
35	Highâ€Uniformity Threshold Switching HfO₂â€Based Selectors with Patterned Ag Nanodots. Advanced Science, 2020, 7, 2002251.	11.2	43
36	Multichannel parallel processing of neural signals in memristor arrays. Science Advances, 2020, 6, .	10.3	36

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37	Neuro-inspired computing chips. Nature Electronics, 2020, 3, 371-382.	26.0	402
38	Atomic threshold-switching enabled MoS2 transistors towards ultralow-power electronics. Nature Communications, 2020, 11, 6207.	12.8	52
39	A Unified Memory and Hardware Security Module Based on the Adjustable Switching Window of Resistive Memory. IEEE Journal of the Electron Devices Society, 2020, 8, 1257-1265.	2.1	5
40	Enhancing LiAlO_X synaptic performance by reducing the Schottky barrier height for deep neural network applications. Nanoscale, 2020, 12, 22970-22977.	5.6	10
41	Neural signal analysis with memristor arrays towardsÂhigh-efficiency brainâ€“machine interfaces. Nature Communications, 2020, 11, 4234.	12.8	82
42	Alloying conducting channels for reliable neuromorphic computing. Nature Nanotechnology, 2020, 15, 574-579.	31.5	160
43	A Compact Model of Analog RRAM With Device and Array Nonideal Effects for Neuromorphic Systems. IEEE Transactions on Electron Devices, 2020, 67, 1593-1599.	3.0	29
44	RRAM-based coprocessors for deep learning. , 2020, , 363-395.		1
45	Power-efficient neural network with artificial dendrites. Nature Nanotechnology, 2020, 15, 776-782.	31.5	141
46	A Selfâ€Terminated Operation Scheme for Highâ€Parallel and Energyâ€Efficient Forming of RRAM Array. Advanced Electronic Materials, 2020, 6, 1901324.	5.1	5
47	Fully hardware-implemented memristor convolutional neural network. Nature, 2020, 577, 641-646.	27.8	1,198
48	A Parallel Multibit Programing Scheme With High Precision for RRAM-Based Neuromorphic Systems. IEEE Transactions on Electron Devices, 2020, 67, 2213-2217.	3.0	34
49	33.2 A Fully Integrated Analog ReRAM Based 78.4TOPS/W Compute-In-Memory Chip with Fully Parallel MAC Computing. , 2020, , .		121
50	A High-performance and Calibration-free True Random Number Generator Based on the Resistance Perturbation in RRAM Array. , 2020, , .		5
51	A circuit-algorithm codesign method to reduce the accuracy drop of RRAM based computing-in-memory chip. , 2020, , .		4
52	Unsupervised Learning on Resistive Memory Array Based Spiking Neural Networks. Frontiers in Neuroscience, 2019, 13, 812.	2.8	50
53	Stateful Logic Operations in One-Transistor-One- Resistor Resistive Random Access Memory Array. IEEE Electron Device Letters, 2019, 40, 1538-1541.	3.9	41
54	Lowâ€Voltage Oscillatory Neurons for Memristorâ€Based Neuromorphic Systems. Global Challenges, 2019, 3, 1900015.	3.6	35

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55	Understanding memristive switching via in situ characterization and device modeling. Nature Communications, 2019, 10, 3453.	12.8	275
56	Endurance and Retention Degradation of Intermediate Levels in Filamentary Analog RRAM. IEEE Journal of the Electron Devices Society, 2019, 7, 1239-1247.	2.1	20
57	Bridging Biological and Artificial Neural Networks with Emerging Neuromorphic Devices: Fundamentals, Progress, and Challenges. Advanced Materials, 2019, 31, e1902761.	21.0	418
58	Reliability Perspective on Neuromorphic Computing Based on Analog RRAM. , 2019, , .		10
59	Impacts of State Instability and Retention Failure of Filamentary Analog RRAM on the Performance of Deep Neural Network. IEEE Transactions on Electron Devices, 2019, 66, 4517-4522.	3.0	37
60	Design Guidelines of RRAM based Neural-Processing-Unit. , 2019, , .		39
61	Analogâ€Type Resistive Switching Devices for Neuromorphic Computing. Physica Status Solidi - Rapid Research Letters, 2019, 13, 1900204.	2.4	83
62	Memristors for Hardware Security Applications. Advanced Electronic Materials, 2019, 5, 1800872.	5.1	35
63	Sub-nanosecond pulse programming and device design strategy for analog resistive switching in HfOx-based resistive random access memory. Applied Physics Letters, 2019, 114, .	3.3	4
64	24.4 Sandwich-RAM: An Energy-Efficient In-Memory BWN Architecture with Pulse-Width Modulation. , 2019, , .		92
65	Associative Memory for Image Recovery with a Highâ€Performance Memristor Array. Advanced Functional Materials, 2019, 29, 1900155.	14.9	50
66	A Threshold Switching Selector Based on Highly Ordered Ag Nanodots for Xâ€Point Memory Applications. Advanced Science, 2019, 6, 1900024.	11.2	91
67	Optimization Strategy for Accelerating Multi-Bit Resistive Weight Programming on the RRAM Array. , 2019, , .		3
68	Device and materials requirements for neuromorphic computing. Journal Physics D: Applied Physics, 2019, 52, 113001.	2.8	105
69	Three-Dimensional nand Flash for Vectorâ€“Matrix Multiplication. IEEE Transactions on Very Large Scale Integration (VLSI) Systems, 2019, 27, 988-991.	3.1	78
70	Thermal Stability of HfO_x-Based Resistive Memory Array: A Temperature Coefficient Study. IEEE Electron Device Letters, 2018, 39, 192-195.	3.9	12
71	A drain leakage phenomenon in poly silicon channel 3D NAND flash caused by conductive paths along grain boundaries. Microelectronic Engineering, 2018, 192, 66-69.	2.4	22
72	Multiplication on the edge. Nature Electronics, 2018, 1, 8-9.	26.0	16

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73	Conduction mechanisms, dynamics and stability in ReRAMs. Microelectronic Engineering, 2018, 187-188, 121-133.	2.4	59
74	Characterizing Endurance Degradation of Incremental Switching in Analog RRAM for Neuromorphic Systems. , 2018, , .		44
75	Suppress variations of analog resistive memory for neuromorphic computing by localizing Vo formation. Journal of Applied Physics, 2018, 124, 152108.	2.5	19
76	A Methodology to Improve Linearity of Analog RRAM for Neuromorphic Computing. , 2018, , .		124
77	Sign backpropagation: An on-chip learning algorithm for analog RRAM neuromorphic computing systems. Neural Networks, 2018, 108, 217-223.	5.9	48
78	Weighted Synapses Without Carry Operations for RRAM-Based Neuromorphic Systems. Frontiers in Neuroscience, 2018, 12, 167.	2.8	10
79	Microstructure evolution characteristics induced by oxygen vacancy generation in anatase TiO₂based resistive switching devices. Semiconductor Science and Technology, 2017, 32, 035018.	2.0	3
80	Direct Observations of Nanofilament Evolution in Switching Processes in HfO₂â€Based Resistive Random Access Memory by In Situ TEM Studies. Advanced Materials, 2017, 29, 1602976.	21.0	137
81	Compact Model of HfO_{<italic>X</italic>}-Based Electronic Synaptic Devices for Neuromorphic Computing. IEEE Transactions on Electron Devices, 2017, 64, 614-621.	3.0	48
82	Face classification using electronic synapses. Nature Communications, 2017, 8, 15199.	12.8	683
83	Neuromorphic Computing based on Resistive RAM. , 2017, , .		4
84	Uniformity improvements of low current 1T1R RRAM arrays through optimized verification strategy. , 2017, , .		6
85	Optimization of RRAM-Based Physical Unclonable Function With a Novel Differential Read-Out Method. IEEE Electron Device Letters, 2017, 38, 168-171.	3.9	44
86	Ultrafast RESET Analysis of HfO_xâ€Based RRAM by Subâ€Nanosecond Pulses. Advanced Electronic Materials, 2017, 3, 1700263.	5.1	46
87	New structure with SiO 2 -gate-dielectric select gates in vertical-channel three-dimensional (3D) NAND flash memory. Microelectronics Reliability, 2017, 78, 80-84.	1.7	6
88	Improving Analog Switching in HfO_{<italic>x</italic>}-Based Resistive Memory With a Thermal Enhanced Layer. IEEE Electron Device Letters, 2017, 38, 1019-1022.	3.9	203
89	Short Time High-Resistance State Instability of TaOx-Based RRAM Devices. IEEE Electron Device Letters, 2017, 38, 32-35.	3.9	22
90	Modeling disorder effect of the oxygen vacancy distribution in filamentary analog RRAM for neuromorphic computing. , 2017, , .		31

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91	Device and Circuit Interaction Analysis of Stochastic Behaviors in Cross-Point RRAM Arrays. IEEE Transactions on Electron Devices, 2017, 64, 4928-4936.	3.0	22
92	Si Interface Barrier Modification on Memristor for Brain-Inspired Computing. Journal of Physics: Conference Series, 2017, 864, 012064.	0.4	0
93	Device and circuit optimization of RRAM for neuromorphic computing. , 2017, , .		53
94	Investigation of statistical retention of filamentary analog RRAM for neuromophic computing. , 2017, , .		57
95	Resistive Random Access Memory for Future Information Processing System. Proceedings of the IEEE, 2017, 105, 1770-1789.	21.3	88
96	Metal oxide resistive random access memory based synaptic devices for brain-inspired computing. Japanese Journal of Applied Physics, 2016, 55, 04EA06.	1.5	26
97	Oxide-based analog synapse: Physical modeling, experimental characterization, and optimization. , 2016, , .		19
98	Binary neural network with 16 Mb RRAM macro chip for classification and online training. , 2016, , .		154
99	HfO₂/Al₂O₃multilayer for RRAM arrays: a technique to improve tail-bit retention. Nanotechnology, 2016, 27, 395201.	2.6	41
100	Self-Selection RRAM Cell With Sub- $mu ext{A}$ Switching Current and Robust Reliability Fabricated by High- K /Metal Gate CMOS Compatible Technology. IEEE Transactions on Electron Devices, 2016, 63, 4295-4301.	3.0	16
101	Disturbance characteristics of half-selected cells in a cross-point resistive switching memory array. Nanotechnology, 2016, 27, 215204.	2.6	5
102	Electrode-induced digital-to-analog resistive switching in TaO_x-based RRAM devices. Nanotechnology, 2016, 27, 305201.	2.6	48
103	Modeling and Optimization of Bilayered TaO_xRRAM Based on Defect Evolution and Phase Transition Effects. IEEE Transactions on Electron Devices, 2016, 63, 1524-1532.	3.0	28
104	Relaxation Effect in RRAM Arrays: Demonstration and Characteristics. IEEE Electron Device Letters, 2016, 37, 182-185.	3.9	27
105	Optimized learning scheme for grayscale image recognition in a RRAM based analog neuromorphic system. , 2015, , .		39
106	Investigation of the synaptic device based on the resistive switching behavior in hafnium oxide. Progress in Natural Science: Materials International, 2015, 25, 47-50.	4.4	22
107	Multi-bit nonvolatile logic implemented with metal-oxide based resistive switching device. Solid State Communications, 2015, 205, 51-54.	1.9	7
108	Nonvolatile Logic and <italic>In Situ</italic> Data Transfer Demonstrated in Crossbar Resistive RAM Array. IEEE Electron Device Letters, 2015, 36, 1142-1145.	3.9	21

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109	Reliability simulation of TMO RRAM. , 2015, , .		0
110	Improved unipolar resistive switching characteristics of mixed-NiOx/NiOy-film-based resistive switching memory devices. Japanese Journal of Applied Physics, 2015, 54, 094201.	1.5	5
111	3-D Resistive Memory Arrays: From Intrinsic Switching Behaviors to Optimization Guidelines. IEEE Transactions on Electron Devices, 2015, 62, 3160-3167.	3.0	16
112	Analysis of the Voltageâ€“Time Dilemma of Metal Oxide-Based RRAM and Solution Exploration of High Speed and Low Voltage AC Switching. IEEE Nanotechnology Magazine, 2014, 13, 1127-1132.	2.0	24
113	Solution Processed Resistive Random Access Memory Devices for Transparent Solid-State Circuit Systems. Materials Research Society Symposia Proceedings, 2014, 1633, 105-110.	0.1	9
114	Write disturb analyses on half-selected cells of cross-point RRAM arrays. , 2014, , .		18
115	Origin and suppressing methodology of intrinsic variations in metal-oxide RRAM based synaptic devices. , 2014, , .		3
116	A SPICE Model of Resistive Random Access Memory for Large-Scale Memory Array Simulation. IEEE Electron Device Letters, 2014, 35, 211-213.	3.9	111
117	3-D Cross-Point Array Operation on <inline-formula> <tex-math notation="TeX">${\rm AlO}_{y}/{\rm HfO}_{x}$ </tex-math></inline-formula>-Based Vertical Resistive Switching Memory. IEEE Transactions on Electron Devices, 2014, 61, 1377-1381.	3.0	22
118	Ultra-Low-Energy Three-Dimensional Oxide-Based Electronic Synapses for Implementation of Robust High-Accuracy Neuromorphic Computation Systems. ACS Nano, 2014, 8, 6998-7004.	14.6	172
119	Investigation of forming process for metal oxide-based resistive switching memory by stochastic simulation. , 2014, , .		1
120	Highly Compact (4F2) and Well Behaved Nano-Pillar Transistor Controlled Resistive Switching Cell for Neuromorphic System Application. Scientific Reports, 2014, 4, 6863.	3.3	19
121	A Novel Defect-Engineering-Based Implementation for High-Performance Multilevel Data Storage in Resistive Switching Memory. IEEE Transactions on Electron Devices, 2013, 60, 1379-1383.	3.0	48
122	HfO_x-Based Vertical Resistive Switching Random Access Memory Suitable for Bit-Cost-Effective Three-Dimensional Cross-Point Architecture. ACS Nano, 2013, 7, 2320-2325.	14.6	309
123	RRAM Crossbar Array With Cell Selection Device: A Device and Circuit Interaction Study. IEEE Transactions on Electron Devices, 2013, 60, 719-726.	3.0	155
124	Monitoring Oxygen Movement by Raman Spectroscopy of Resistive Random Access Memory with a Graphene-Inserted Electrode. Nano Letters, 2013, 13, 651-657.	9.1	121
125	A Physics-Based Compact Model of Metal-Oxide-Based RRAM DC and AC Operations. IEEE Transactions on Electron Devices, 2013, 60, 4090-4097.	3.0	169
126	Degradation Characteristics of Resistive Switching Memory Devices Correlated with Electric Field Induced Ion-Migration Effect of Anode. Chinese Physics Letters, 2013, 30, 117104.	3.3	0

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127	A Low Energy Oxideâ€Based Electronic Synaptic Device for Neuromorphic Visual Systems with Tolerance to Device Variation. Advanced Materials, 2013, 25, 1774-1779.	21.0	445
128	Stochastic learning in oxide binary synaptic device for neuromorphic computing. Frontiers in Neuroscience, 2013, 7, 186.	2.8	129
129	Complementary Metal Oxide Semiconductor Compatible Hf-Based Resistive Random Access Memory with Ultralow Switching Current/Power. Japanese Journal of Applied Physics, 2012, 51, 04DD08.	1.5	2
130	Physical mechanism of resistive switching and optimization design of cell in oxide-based RRAM. , 2012, , .		0
131	A neuromorphic visual system using RRAM synaptic devices with Sub-pJ energy and tolerance to variability: Experimental characterization and large-scale modeling. , 2012, , .		148
132	Resistive switching characteristics in HfOx layer by using current sweep mode. Microelectronic Engineering, 2012, 94, 14-17.	2.4	7
133	Complementary Metal Oxide Semiconductor Compatible Hf-Based Resistive Random Access Memory with Ultralow Switching Current/Power. Japanese Journal of Applied Physics, 2012, 51, 04DD08.	1.5	3
134	Modeling of Retention Failure Behavior in Bipolar Oxide-Based Resistive Switching Memory. IEEE Electron Device Letters, 2011, 32, 276-278.	3.9	61
135	A physical model for bipolar oxide-based resistive switching memory based on ion-transport-recombination effect. Applied Physics Letters, 2011, 98, .	3.3	31
136	Engineering oxide resistive switching materials for memristive device application. Applied Physics A: Materials Science and Processing, 2011, 102, 991-996.	2.3	31
137	Gd-doping effect on performance of HfO2 based resistive switching memory devices using implantation approach. Applied Physics Letters, 2011, 98, .	3.3	165
138	Improved Uniformity of Resistive Switching Behaviors in HfO[sub 2] Thin Films with Embedded Al Layers. Electrochemical and Solid-State Letters, 2010, 13, H36.	2.2	121
139	Ionic doping effect in ZrO2 resistive switching memory. Applied Physics Letters, 2010, 96, .	3.3	154
140	Unified Physical Model of Bipolar Oxide-Based Resistive Switching Memory. IEEE Electron Device Letters, 2009, 30, 1326-1328.	3.9	167