Robert J Kaplar

List of Publications by Year
in descending order

109 papers	2,579 citations	236612 25 h-index	205818 48 g-index
109 all docs	109 docs citations	109 times ranked	2553 citing authors

#	Article	IF	Citations
1	Ultrawideâ€Bandgap Semiconductors: Research Opportunities and Challenges. Advanced Electronic Materials, 2018, 4, 1600501.	2.6	839
2	Room-temperature direct current operation of 290 nm light-emitting diodes with milliwatt power levels. Applied Physics Letters, 2004, 84, 3394-3396.	1.5	155
3	An AlN/Al0.85Ga0.15N high electron mobility transistor. Applied Physics Letters, 2016, 109, .	1.5	108
4	Reviewâ€"Ultra-Wide-Bandgap AlGaN Power Electronic Devices. ECS Journal of Solid State Science and Technology, 2017, 6, Q3061-Q3066.	0.9	104
5	Vertical GaN Power Diodes With a Bilayer Edge Termination. IEEE Transactions on Electron Devices, 2016, 63, 419-425.	1.6	91
6	Deep levels in p-type InGaAsN lattice matched to GaAs. Applied Physics Letters, 1999, 74, 2830-2832.	1.5	83
7	High voltage and high current density vertical GaN power diodes. Electronics Letters, 2016, 52, 1170-1171.	0.5	64
8	Slow Detrapping Transients due to Gate and Drain Bias Stress in High Breakdown Voltage AlGaN/GaN HEMTs. IEEE Transactions on Electron Devices, 2012, 59, 2115-2122.	1.6	42
9	Deep levels and their impact on generation current in Sn-doped InGaAsN. Journal of Applied Physics, 2001, 90, 3405-3408.	1.1	40
10	Deep-level defects in InGaAsN grown by molecular-beam epitaxy. Applied Physics Letters, 2002, 80, 4777-4779.	1.5	39
11	Ultrawide bandgap semiconductors. Applied Physics Letters, 2021, 118, .	1.5	38
12	Generation-After-Next Power Electronics: Ultrawide-bandgap devices, high-temperature packaging, and magnetic nanocomposite materials. IEEE Power Electronics Magazine, 2017, 4, 36-42.	0.6	36
13	Ohmic contacts to Alâ€rich AlGaN heterostructures. Physica Status Solidi (A) Applications and Materials Science, 2017, 214, 1600842.	0.8	36
14	Al_{0.85}Ga_{0.15}N/Al_{0.70}Ga_{0.30}N High Electron Mobility Transistors with Schottky Gates and Large On/Off Current Ratio over Temperature. ECS Journal of Solid State Science and Technology, 2017, 6, Q161-Q165.	0.9	36
15	Analysis of 2D Transport and Performance Characteristics for Lateral Power Devices Based on AlGaN Alloys. ECS Journal of Solid State Science and Technology, 2017, 6, S3114-S3118.	0.9	36
16	Operation Up to 500 Â°C of Al_{0.85}Ga_{0.15}N/Al_{0.7}Ga_{0.3}N High Electron Mobility Transistors. IEEE Journal of the Electron Devices Society, 2019, 7, 444-452.	1.2	36
17	Al-rich AlGaN based transistors. Journal of Vacuum Science and Technology A: Vacuum, Surfaces and Films, 2020, 38, .	0.9	33
18	A derivation of the van der Pauw formula from electrostatics. Solid-State Electronics, 2008, 52, 91-98.	0.8	31

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19	Multidimensional thermal analysis of an ultrawide bandgap AlGaN channel high electron mobility transistor. Applied Physics Letters, 2019, 115, .	1.5	30
20	Transport and breakdown analysis for improved figure-of-merit for AlGaN power devices. Journal of Applied Physics, 2017, 121, .	1.1	28
21	Simulations of Junction Termination Extensions in Vertical GaN Power Diodes. IEEE Transactions on Electron Devices, 2017, 64, 2291-2297.	1.6	28
22	Electroreflectance studies of Stark shifts and polarization-induced electric fields in InGaN/GaN single quantum wells. Journal of Applied Physics, 2004, 95, 4905-4913.	1.1	27
23	On dielectric breakdown in silicon-rich silicon nitride thin films. Applied Physics Letters, 2009, 94, .	1.5	27
24	Extraction of trapped charge in 4H-SiC metal oxide semiconductor field effect transistors from subthreshold characteristics. Applied Physics Letters, 2011, 99, .	1.5	27
25	Performance and Breakdown Characteristics of Irradiated Vertical Power GaN P-i-N Diodes. IEEE Transactions on Nuclear Science, 2015, 62, 2912-2918.	1.2	27
26	RF Performance of Al0.85Ga0.15N/Al0.70Ga0.30N High Electron Mobility Transistors with 80 nm Gates. IEEE Electron Device Letters, 2018, , 1-1.	2.2	27
27	Demonstration of >6.0-kV Breakdown Voltage in Large Area Vertical GaN p-n Diodes With Step-Etched Junction Termination Extensions. IEEE Transactions on Electron Devices, 2022, 69, 1931-1937.	1.6	26
28	Ultrawide-bandgap semiconductors: An overview. Journal of Materials Research, 2021, 36, 4601-4615.	1.2	23
29	Characterization and reliability of SiC- and GaN-based power transistors for renewable energy applications. , 2012, , .		22
30	Radiation Response of AlGaN-Channel HEMTs. IEEE Transactions on Nuclear Science, 2019, 66, 344-351.	1.2	21
31	Lifetime testing of metallized thin film capacitors for inverter applications. , 2013, , .		20
32	Extreme Temperature Operation of Ultra-Wide Bandgap AlGaN High Electron Mobility Transistors. IEEE Transactions on Semiconductor Manufacturing, 2019, 32, 473-477.	1.4	19
33	PV inverter performance and reliability: What is the role of the IGBT?. , 2011, , .		18
34	Analysis of the dependence of critical electric field on semiconductor bandgap. Journal of Materials Research, 2022, 37, 849-865.	1.2	16
35	Evaluation of a â€œField Cageâ€•for Electric Field Control in GaN-Based HEMTs That Extends the Scalability of Breakdown Into the kV Regime. IEEE Transactions on Electron Devices, 2017, 64, 3740-3747.	1.6	15
36	Interdependence of Electronic and Thermal Transport in Al_xGa_{1â€“x}N Channel HEMTs. IEEE Electron Device Letters, 2020, 41, 461-464.	2.2	15

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37	Device-Level Multidimensional Thermal Dynamics With Implications for Current and Future Wide Bandgap Electronics. Journal of Electronic Packaging, Transactions of the ASME, 2020, 142, .	1.2	14
38	Characterization of fast interface states in nitrogen- and phosphorus-treated 4H-SiC MOS capacitors. Semiconductor Science and Technology, 2015, 30, 075011.	1.0	13
39	Spectroscopic investigations of band offsets of MgO|AlxGa1-xN epitaxial heterostructures with varying AlN content. Applied Physics Letters, 2015, 107, .	1.5	12
40	Ultrafast Reverse Recovery Time Measurement for Wide-Bandgap Diodes. IEEE Transactions on Power Electronics, 2017, 32, 9333-9341.	5.4	12
41	Inductively coupled BCl3/Cl2/Ar plasma etching of Al-rich AlGaN. Journal of Vacuum Science and Technology A: Vacuum, Surfaces and Films, 2017, 35, .	0.9	12
42	Optical and electrical step-recovery study of minority-carrier transport in an InGaNâˆ•GaN quantum-well light-emitting diode grown on sapphire. Applied Physics Letters, 2004, 85, 5436-5438.	1.5	11
43	IEEE ITRW Working Group Position Paper-Materials and Devices: WBG and UWBG Materials and Devices Are Examined in a New Working Group. IEEE Power Electronics Magazine, 2018, 5, 45-48.	0.6	11
44	High-frequency, high-power performance of AlGaN-channel high-electron-mobility transistors: an RF simulation study. Japanese Journal of Applied Physics, 2019, 58, SCCD04.	0.8	11
45	High Temperature and Power Dependent Photoluminescence Analysis on Commercial Lighting and Display LED Materials for Future Power Electronic Modules. Scientific Reports, 2019, 9, 16758.	1.6	11
46	Role of barrier structure in current collapse of AlGaN/GaN high electron mobility transistors. Applied Physics Letters, 2012, 101, 243506.	1.5	10
47	Analysis and prediction of stability in commercial, 1200 V, 33A, 4H-SiC MOSFETs. , 2012, , .		9
48	Identification of the primary compensating defect level responsible for determining blocking voltage of vertical GaN power diodes. Applied Physics Letters, 2016, 109, .	1.5	9
49	Non-Isothermal Simulations to Optimize SiC MOSFETs for Enhanced Short-Circuit Ruggedness. , 2020, , .		9
50	Switching characterization of vertical GaN PiN diodes. , 2016, , .		8
51	High-Temperature Analysis of GaN-Based Blue-LEDs for Future Power Electronic Applications. IEEE Journal of Emerging and Selected Topics in Power Electronics, 2020, 8, 4186-4190.	3.7	8
52	Effect of GaN Substrate Properties on Vertical GaN PiN Diode Electrical Performance. Journal of Electronic Materials, 2021, 50, 3013-3021.	1.0	8
53	Optimizing performance and yield of vertical GaN diodes using wafer scale optical techniques. Scientific Reports, 2022, 12, 658.	1.6	8
54	Insulated gate bipolar transistor reliability testing protocol for PV inverter applications. Progress in Photovoltaics: Research and Applications, 2014, 22, 970-983.	4.4	7

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55	Imaging the Impact of Proton Irradiation on Edge Terminations in Vertical GaN PIN Diodes. IEEE Electron Device Letters, 2017, 38, 945-948.	2.2	7
56	Design optimization of GaN vertical power diodes and comparison to Si and SiC. , 2017, , .		7
57	Saturation Velocity Measurement of Al0.7Ga0.3N-Channel High Electron Mobility Transistors. Journal of Electronic Materials, 2019, 48, 5581-5585.	1.0	7
58	Bevel Edge Termination for Vertical GaN Power Diodes. , 2019, , .		7
59	Systematic Investigation of Spontaneous Emission Quantum Efficiency Drop up to 800 K for Future Power Electronics Applications. IEEE Journal of Emerging and Selected Topics in Power Electronics, 2020, 8, 845-853.	3.7	7
60	Prediction of Pareto-optimal performance improvements in a power conversion system using GaN devices. , 2017, , .		6
61	Sensitivity analysis of a technique for the extraction of interface trap density in SiC MOSFETs from subthreshold characteristics. , 2014, , .		5
62	Miniature high voltage, high temperature component package development. , 2016, , .		5
63	A Study on the Impact of Mid-Gap Defects on Vertical GaN Diodes. IEEE Transactions on Semiconductor Manufacturing, 2020, 33, 546-551.	1.4	5
64	Study on Avalanche Uniformity in 1.2KV GaN Vertical PIN Diode with Bevel Edge-Termination. , 2021, , .		5
65	Development of High-Voltage Vertical GaN PN Diodes. , 2020, , .		5
66	TDDB and Pulse-Breakdown Studies of Si-Rich $ hbox{SiN}_{x}$ Antifuses and Antifuse-Based ROMs. IEEE Transactions on Electron Devices, 2011, 58, 224-228.	1.6	4
67	Two-photon absorption pulsed-laser single-event effect technique for GaN materials and the impact of deep level traps on the carrier generation process. , 2016, , .		4
68	at]Hard-switching reliability studies of 1200 V vertical GaN PiN diodes. MRS Communications, 2018, 8, 1413-1417.	0.8	4
69	Impact of Anode Thickness on Breakdown Mechanisms in Vertical GaN PiN Diodes with Planar Edge Termination. Crystals, 2022, 12, 623.	1.0	4
70	Optimization and performance of AlGaN-based multi-quantum-well deep-UV LEDs. , 2004, , .		3
71	Progress in SiC MOSFET Reliability. ECS Transactions, 2013, 58, 211-220.	0.3	3
72	Trap-related parametric shifts under DC bias and switched operation life stress in power AlGaN/GaN HEMTs. , 2014, , .		3

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73	In-Operando Spatial Imaging of Edge Termination Electric Fields in GaN Vertical p-n Junction Diodes. IEEE Electron Device Letters, 2016, , 1-1.	2.2	3
74	Ohmic Contact-Free Mobility Measurement in Ultra-Wide Bandgap AlGaN/AlGaN Devices. IEEE Electron Device Letters, 2018, 39, 55-58.	2.2	3
75	III-Nitride ultra-wide-bandgap electronic devices. Semiconductors and Semimetals, 2019, 102, 397-416.	0.4	3
76	Highâ€Temperature Optical Characterization of GaNâ€Based Lightâ€Emitting Diodes for Future Power Electronic Modules. Physica Status Solidi (A) Applications and Materials Science, 2020, 217, 1900792.	0.8	3
77	Simulation and Design of Step-Etched Junction Termination Extensions for GaN Power Diodes. , 2020, , .		3
78	Device performance of AlGaN-based 240-300-nm deep UV LEDs. , 2004, 5530, 38.		2
79	Advances in AlGaN-based Deep UV LEDs. Materials Research Society Symposia Proceedings, 2004, 831, 67.	0.1	2
80	Novel optical probes of InGaN/GaN light-emitting diodes: 1. Electroreflectance Stark spectroscopy, and 2. Time-resolved emission. Physica Status Solidi C: Current Topics in Solid State Physics, 2005, 2, 2866-2870.	0.8	2
81	Sub-bandgap light-induced carrier generation at room temperature in 4H-SiC metal oxide semiconductor capacitors. Applied Physics Letters, 2011, 99, 173502.	1.5	2
82	Impact of gate stack on the stability of normally-Off AlGaN/GaN power switching HEMTs. , 2014, , .		2
83	Quantum-Confined Stark Effect and Polarization Field in Single Quantum Well InGaN/GaN LEDs. Materials Research Society Symposia Proceedings, 2005, 892, 736.	0.1	2
84	Identification of the defect dominating high temperature reverse leakage current in vertical GaN power diodes through deep level transient spectroscopy. Applied Physics Letters, 2022, 120, .	1.5	2
85	A discussion on various experimental methods of impact ionization coefficient measurement in GaN. AIP Advances, 2022, 12, 030703.	0.6	2
86	(Invited) High Power Semiconductor Devices for FACTS: Current State of the Art and Opportunities for Advanced Materials. ECS Transactions, 2011, 41, 19-30.	0.3	1
87	Influence of barrier design on current collapse in high voltage AlGaN/GaN HEMTs. , 2013, , .		1
88	Interaction of Defects with Quantum Well States: Electrostatic-Dependant Response Time for Traps in AlGaN/GaN HEMTs. ECS Transactions, 2013, 58, 365-374.	0.3	1
89	PV inverter performance and reliability: What is the role of the bus capacitor?. , 2013, , .		1
90	Module-level paralleling of vertical GaN PiN diodes. , 2016, , .		1

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91	An AlN/Al<inf>0.85</inf>Ga<inf>0.15</inf>N high electron mobility transistor with a regrown ohmic contact. , 2016, , .		1
92	Deep-Level Characterization: Electrical and Optical Methods. Power Electronics and Power Systems, 2017, , 145-163.	0.6	1
93	High Temperature Photoluminsence of InGaN-Based MQWs on Patterned Sapphire Substrates. , 2018, , .		1
94	Co-Optimization of Boost Converter Reliability and Volumetric Power Density Using Genetic Algorithm. , 2020, , .		1
95	On-Wafer Investigation of Avalanche Robustness in 1.3 kV GaN-on-GaN P-N Diode Under Unclamped Inductive Switching Stress. , 2021, , .		1
96	A Co-Design Approach to Understanding the Impact of Ultra-Wide-Bandgap Semiconductor Material Properties on Power Device Performance. , 2022, , .		1
97	Characterization of Minority-Carrier Hole Transport in Nitride-Based Light-Emitting Diodes with Optical and Electrical Time-Resolved Techniques. Materials Research Society Symposia Proceedings, 2004, 831, 108.	0.1	0
98	Sub-Bandgap Light-Induced Carrier Generation at Room Temperature in Silicon Carbide MOS Capacitors. Materials Science Forum, 2012, 717-720, 441-444.	0.3	0
99	Impact of the Al Mole Fraction in the Bulk- and Surface-State Induced Instability of AlGaN/GaN HEMTs. Materials Research Society Symposia Proceedings, 2012, 1432, 151.	0.1	0
100	Photocapacitance Decay Technique for Interface Trap Characterization Near Inversion Band in Wide Bandgap MOS Capacitors. IEEE Transactions on Electron Devices, 2013, 60, 2619-2625.	1.6	0
101	GaN-Based Wide-Bandgap Power Switching Devices: From Atoms to the Grid. ECS Transactions, 2013, 50, 199-209.	0.3	0
102	Progress in SiC MOSFET Reliability. ECS Transactions, 2014, 64, 87-98.	0.3	0
103	Trapping characteristics and parametric shifts in lateral GaN HEMTs with SiO<inf>2</inf>/AlGaN gate stacks. , 2015, , .		0
104	Stability in Fluorine-Treated Al-Rich High Electron Mobility Transistors with 85% Al-Barrier Composition. , 2019, , .		0
105	Comparison Study of High-Temperature Spontaneous Emission Quantum Efficiency of Commercial LED Materials. , 2019, , .		0
106	High-Al-content heterostructures and devices. Semiconductors and Semimetals, 2021, , 191-222.	0.4	0
107	Comparison of deep level spectra of MBE- and MOCVD-grown InGaAsN. Materials Research Society Symposia Proceedings, 2002, 719, 1331.	0.1	0
108	High-Temperature Optical Characterization of Wide Band Gap Light Emitting Diodes and Photodiodes for Future Power Module Application. Advances in Science, Technology and Engineering Systems, 2019, 4, 17-22.	0.4	0

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109	Integrated Optical Probing of the Thermal Dynamics of Wide Bandgap Power Electronics. , 2019, , .		0