

# **2019 16th China International Forum on Solid State Lightning & 2019 International Forum on Wide Bandgap Semiconductors China (SSLChina: IFWS 2019)**

**Shenzhen, China  
25 – 27 November 2019**



**IEEE Catalog Number: CFP19J64-POD  
ISBN: 978-1-7281-5757-3**

**Copyright © 2019 by the Institute of Electrical and Electronics Engineers, Inc.  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP19J64-POD
ISBN (Print-On-Demand):	978-1-7281-5757-3
ISBN (Online):	978-1-7281-5756-6

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

## TABLE OF CONTENTS

Sr. No.	Title	Page No.
1	<b>Advanced Chemical Concentration Control for Fabrication of Devices Using SiC</b> J. Boecker, I. Kashkoush, and D. Waugh <b>Paper ID: P201-201907301401</b>	1-3
2	<b>The Synthesis of Large-size Silicon Carbide Powder for Crystal Growth</b> Fang Jiao, Dianpeng Cui, Mulong Yang, Zhouli Wu and Boyu Dong <b>Paper ID: P201-201909091152</b>	4-6
3	<b>Investigation of Defect Levels of Al/Ti 4H-SiC Schottky structures by Deep Level Transient Spectroscopy</b> Yawei He, Guoguo Yan, Xingfang Liu, Zhanwei Shen, Wanshun Zhao, Lei Wang, Feng Zhang, Guosheng Sun, Yiping Zeng <b>Paper ID: P201-201909171928</b>	7-10
4	<b>Polytype Transformation in 4H-SiC single crystals grown on on-axis Seeds</b> Xianglong Yang, Yan Peng, Xiufang Chen, Xuejian Xie, Jinying Yu, Xiaobo Hu, Xiangang Xu <b>Paper ID: P201-201909270936</b>	11-13
5	<b>Application of In-situ Pre-epi Clean Process for Next Generation Semiconductor Devices</b> Darian Waugh, Gim Chen, Jennifer Boecker and Ismail Kashkoush <b>Paper ID: P202-201907301402</b>	14-17
6	<b>An Improved Composite JTE Termination Technique for Ultrahigh Voltage 4H-SiC Power Devices</b> Rui Hu, Xiaochuan Deng, XiaoJie Xu, Xuan Li, Juntao Li , Zhiqiang Li, Yourun Zhang, and Bo Zhang <b>Paper ID: P202-201909140022</b>	18-21
7	<b>Electro-thermal Analysis of 1.2kV-100A SiC JBS Diodes Under Current Overload</b> Wei Zhong, Yidan Tang, Chengzhan Li, Hong Chen, Yourun Zhang, Yun Bai, Xinyu Liu <b>Paper ID: P202-201909141826</b>	22-25
8	<b>Simulation Study on Current Collapse Effect of E GaN HEMT</b> Guo Weiling, Ma Qijing, Du Shuai, Lin Tianyu, Zhu Yanxu <b>Paper ID: P202-201909151329</b>	26-28
9	<b>A New SiC Split-gate MOSFET Structure with Protruded P-base and the Mesa above JFET for Improving HF-FOM</b> Kunlin Li, Yourun Zhang, Wei Zhong, Xiaochuan Deng, Xiao Yang, Hang Chen, Bo Zhang <b>Paper ID: P202-201909151518</b>	29-32
10	<b>6.5kV Silicon Carbide Discontinuous Trenched Junction Barrier Schottky Diode</b> Zhiyu Chen, Xuan Li, Xiaochuan Deng, Juntao Li, Zhiqiang Li, Yourun Zhang, and Bo Zhang <b>Paper ID: P202-201909151530</b>	33-36
11	<b>Design and Characteristics of an Etching Field Limiting Ring for 10kV SiC Power Device</b> Yi Wen, Xiaojie Xu, Hao Zhu, Xuan Li, Xiaochuan Deng, Fei Yang, Juntao Li and Bo Zhang <b>Paper ID: P202-201909211821</b>	37-41

<b>Sr. No.</b>	<b>Title</b>	<b>Page No.</b>
12	<b>Improvement of Clamped Inductive Turn-Off Ruggedness of Trench IGBT at Overcurrent Condition with Optimized Split Gate Structure</b> Jiang Lu, Jiawei Liu, Xiaoli Tian, Hong Chen, Fei Liang, Yun Bai <b>Paper ID: P202-201909230956</b>	42-45
13	<b>Optimized Design of 4H-SiC VDMOSFET for Low ON-resistance</b> Defu Yin, Zhiming Wu, Xian Zou, Yongqiang Sun, Yaping Wu, Weiping Wang, Xu Li, and Junyong Kang <b>Paper ID: P202-201909301547</b>	46-49
14	<b>Design and Fabrication of 3300V 100mΩ 4H-SiC MOSFET with Stepped p-body Structure</b> Weijiang Ni, Xiaoliang Wang, Miaoling Xu, Mingshan Li, ChunFeng, Holger Schlichting, Tobias Erlbacher <b>Paper ID: P202-201911111204</b>	50-53
15	<b>Study on Preparation and Application of Nano-copper Powder for Power Semiconductor Device Packaging</b> Xu Pan, Jiacheng Zhou, Jingguo Zhang, Zhaohui Zhao, Minghui Liang, Huaiyu Ye, Qiang Hu, Huijun He, Limin Wang, Ligen Wang, Fengcai Qi, Youzhi Zhou <b>Paper ID: P202-201911221359</b>	54-58
16	<b>A Highly Integrated Multi-parameters RF Transceiver Module for Microwave Semiconductor Chip Testing</b> Guangshan Zhang, Miao Song, Rongbin Guo, Yahai Wang, Lei Liu, Jie Yang, Shichao Liu, Yisheng Yang <b>Paper ID: P203-201907301407</b>	59-62
17	<b>High Precision Model by Error Compensation Method based on the Angelov Model</b> Ziyue Zhao, Yang Lu, Hengshuang Zhang, Chupeng Yi, Yuchen Wang, Xiaohua Ma and Yue Hao <b>Paper ID: P203-201909122336</b>	63-66
18	<b>A Novel Scalable Series MIM Capacitor Model for MMIC Applications</b> Chupeng Yi, Yang Lu, Hengshuang Zhang, Ziyue Zhao, Xiaohua Ma, and Yue Hao <b>Paper ID: P203-201909151126</b>	67-70
19	<b>A Compact X-band Pallet Power Amplifier Using GaN MMIC and Discrete FETs with HMIC Technology</b> Wang Yi, Ni Tao, Yin Jun, Mo Jianghui, Yu Ruoqi, Li Jing, Dong Shiliang, Liu Ze, Chen Lei, He Jian, Huang Luoguang <b>Paper ID: P203-201910080737</b>	71-73
20	<b>Facet Formation of AlGaN/AlN-based Multiple Quantum Wells by Laser Scribing</b> Bin Xue, Jianchang Yan, Yanan Guo, Chunyan Liu, Yiping Zeng, Junxi Wang and Jinmin Li <b>Paper ID: P204-201909281853</b>	74-76
21	<b>Studies on primary lens for LED light source to enhance lateral emission intensity</b> Wenting Tang, Baojin Chen, Rui Zhang, Baoxing Wang, Yunfei Sun, Jiahua Min, Shuqi Li, Yong Cai <b>Paper ID: P205-201907020925</b>	77-80

<b>Sr. No.</b>	<b>Title</b>	<b>Page No.</b>
22	<b>High color rendering index white LEDs fabricated using InP/ZnS green-emitting quantum dots and InP/ZnSe/ZnS red-emitting quantum dots</b> Doudou Zhang, Yuxian Yan, Fan Cao, Gongli Lin, Xuyong Yang, Wanwan Li, Luqiao Yin, Jianhua Zhang <b>Paper ID: P205-201909121659</b>	81-84
23	<b>Violet Chip Excited White LEDs for Sun-Like Lighting and Horticulture Lighting</b> Yue Zhuo, Hongyuan Zhu, Chongyu Shen, Guoxi Sun, Jay Guoxu Liu <b>Paper ID: P205-201909141235</b>	85-89
24	<b>High-efficiency GaN-based LED with patterned SiO<sub>2</sub> passivation layer and discontinuous current block layer</b> Jie Deng, Weiling Guo, Jianpeng Tai, Zehua Lu, Mengmei Li <b>Paper ID: P205-201909151348</b>	90-92
25	<b>Thermal Simulations of a UV LED module with nanosilver sintered die attach process on graphene-coated copper substrates</b> Pan Liu, Yong Li, Xiaobin Jian, Chen Jing, Min Li, Shurong Ding, Guoqi Zhang <b>Paper ID: P205-201909152037</b>	93-97
26	<b>The contrast ratio improvement of perovskite nanocrystals LEDs devices based on carbon nanotubes</b> Caiman Yan, Hanguang Lu, Zongtao Li, Jiexin Li, Jiasheng Li, Yong Tang, Binhai Yu <b>Paper ID: P205-201909171425</b>	98-102
27	<b>Preparation of Translucent Al<sub>2</sub>O<sub>3</sub> Ceramic Substrates for LED Filament Bulb</b> Yizheng Zhang, Ling Gao, Fengpo Yuan, Yaguang Wu, Dongsheng Wang, Caihua Ren, Hongbo Bai <b>Paper ID: P205-201910121051</b>	103-106
28	<b>Study on high power density light-emitting diodes light source</b> Huaiwen Zheng, Zhonghua Deng, Zhuguang Liu, Fei Yu, Yan Li, Yuming Yang, Qiao Liang, Hua Yang, Xiaoyan Yi, Junxi Wang, Jinmin Li <b>Paper ID: P205-201910281116</b>	107-110
29	<b>Review of High Power Phosphor-Converted Light-Emitting Diodes</b> Yan Li, Yuming Yang, Huaiwen Zheng, Fei Yu, Qiao Liang, Hua Yang, Xiaoyan Yi, Junxi Wang, Jinmin Li <b>Paper ID: P205-201910301118</b>	111-115
30	<b>Effects of Different Ratios of Red and Blue Light on the Morphology and Photosynthetic Characteristics of <i>Anoectochilus roxburghii</i></b> Rui Li, Yinghui Mu, Hongyu Wei, Lixue Zhu, Wenqi Tang, Zhiyu MA <b>Paper ID: P206-201909152318</b>	116-120
31	<b>Effect of Different LED Light Sources on Growth and Development of Cherry Radish</b> Zhipeng Wen, Yumei Zhou, Shaoming Luo, Hongyu Wei, Xiaomin Li, Jiawei Liu, Zhiyu Ma* <b>Paper ID: P206-201909152325</b>	121-124
32	<b>Calculation Method for Chicken-Perceived Light Intensity</b> Zhichao Li, Xiaocui Wang, Baoming Li, Weichao Zheng, Zhengxiang Shi, Qin Tong <b>Paper ID: P206-201909252231</b>	125-129

<b>Sr. No.</b>	<b>Title</b>	<b>Page No.</b>
33	<b>Effects of LED Light Color and Intensity on Feather Pecking and Fear Responses of Layer Breeders in Natural Mating Colony Cages</b> Haipeng Shi, Baoming Li, Qin Tong , Weichao Zheng, Dan Zeng and Guobin Feng <b>Paper ID: P206-201909282235</b>	130-138
34	<b>Effects of Illumination and Color Temperature Distribution on Subjective Perception</b> Dandan Hou, Congshan Dai, Yan Lu, Yandan Lin <b>Paper ID: P207-201906302251</b>	139-143
35	<b>Research on train light environment evaluation method</b> Sijie He, Jinrong Liu, Shuo Jing, Yandan Lin <b>Paper ID: P207-201906302252</b>	144-148
36	<b>Effect of Illuminance and Light Strobe on Attention and Visual Fatigue in Indoor Lighting</b> Jin Yang, Tianchi Zhang, Yandan Lin, Wei Xu <b>Paper ID: P207-201906302253</b>	149-152
37	<b>Study of the Stroboscopic Effect Visibility Measure (SVM) based on Cognitive Performance</b> Xiaojie Zhao, Mengxin Li, Yandan Lin, Wei Xu <b>Paper ID: P207-201906302254</b>	153-156
38	<b>A summary to the personal consideration about the light's influence on myopia, procreation and even philosophy &amp; society</b> Wenqing Fang, Chaopu Yang, Kaiqi Fang, Han Jin, Xu Zhang, Xiaojian Han, Chaolin Ma, Yuehui Zheng, Fan Yang, Jiang Fu, Tuanqing Fang, Guoqing Fang, Taiyang Chen, Shanxiao Huang, Youming Zhang, Zhenquan Lai <b>Paper ID: P207-201907271546</b>	157-162
39	<b>Influences of Blue Component in White Light on Visual Discomfort</b> Yin Zhang, Yan Tu, Lili Wang <b>Paper ID: P207-201907301427</b>	163-166
40	<b>Infer light diffuseness on light probes with different kinds of mesoreliefs</b> Yudi Wang, Ling Xia, Jinfeng Huang, Ruipeng Xu, Xiaofeng Liu <b>Paper ID: P207-201908031348</b>	167-170
41	<b>The Effect of Lighting on Stereo Vision Test with Random-Dot Stereogram</b> Jinfeng Huang, Tingting Zhang, Yudi Wang, Jinwei Xie, Xiaofeng Liu <b>Paper ID: P207-201908032049</b>	171-174
42	<b>Design of a multi - wavelength high irradiance LED phototherapy system for LLLT</b> Weimin Li, Zhiliang Jin, Jialin Liu, Liquan Guo, Haiyang Wang, Daxi Xiong <b>Paper ID: P207-201909051308 (Oral)</b>	175-179
43	<b>Multi-chip dynamic white light emitting diode with high level photobiological safety and good color fidelity</b> J.X. Nie, Z.Z. Chen, F. Jiao, C.C. Li, Y.F. Chen, J.L. Zhan, Y.Y. Chen, T.J. Yu, X.N. Kang, Y.Z. Wang, S.F. Li, G.Y. Zhang and B. Shen <b>Paper ID: P207-201909121908</b>	180-184

<b>Sr. No.</b>	<b>Title</b>	<b>Page No.</b>
44	<b>The Influence of Lighting on Human Circadian Rhythms</b> Hung-Wei Chen, Chien-Yu Chen, Pei-Jung Wu <b>Paper ID: P207-201909150203</b>	185-188
45	<b>The effect of Emel and CCT of Dynamic Lighting on Alertness, Fatigue and Circadian Responses</b> Yu Liu, Ming Ronnier Luo, Peijung Wu, Binyu Teng <b>Paper ID: P207-201909201744</b>	189-191
46	<b>Applying LEDs as Therapeutic Light Sources for Anti-microbial Treatment: An Experimental Study</b> Tianfeng Wang, Jianfei Dong and Guoqi Zhang <b>Paper ID: P207-201909271407</b>	192-195
47	<b>Influence of dynamic-brightness environment on ocular physiological parameters</b> Shanshan Zeng, Wentao Hao, Ya Guo, Xiangyu Qu, Ke Wei, Shanshan Tang, Rongrong Wen, Jianqi Cai <b>Paper ID: P207-201910081046</b>	196-200
48	<b>Study on 3D thermal transport in micro-LEDs on GaN substrate at the level of kW/cm<sup>2</sup></b> Zhizhong Chen, Chengcheng L, Fei Jiao, Jinglin Zhan, Yifan Chen, Yiyong Chen, Jingxin Nie, Tongyang Zhao, Xiangning Kang, Shiwei Feng, Guoyi Zhang, Bo Shen <b>Paper ID: P208-201908281659</b>	201-205
49	<b>Influence of the Charge Transfer on the Lifetime of Quantum-Dot Light-Emitting Diodes</b> Yue Liang, Chongyu Shen, Junfei Chen, Weiye Zheng, Zheng Xu, Jay Guoxu Liu <b>Paper ID: P208-201909152328</b>	206-209
50	<b>Effect of Mechanical Stress on the Electrical Characteristics of Different Type IGBT Chips</b> Yihui Zhang, Jinyuan Li, Yinghan Liu, Guanbin Wu <b>Paper ID: P209-201909171702</b>	210-213
51	<b>Optimal thermal design of LED automotive headlamp with the response surface method</b> Zhibin Tang, Jiajie Fan, Wei Chen, Yutong Li, Moumouni Guero Mohamed, Ru Li <b>Paper ID: P210-201907101533</b>	214-219
52	<b>Optical and Thermal Designs of LED Matrix Module used in Automotive Headlamps</b> Wei Chen, Jiajie Fan, Gaojin Qi, Chengzhong Sun, Weiqiao Yang <b>Paper ID: P210-201907290929</b>	220-224
53	<b>Comparison of Life Testing Standards for LED Lighting Products</b> Zhu Zhike, Cao Suming, Cai Shasha, Shi Tingting, Lian Yuanhui <b>Paper ID: P210-201907301518</b>	225-230
54	<b>A Comparative Study of the Lifetimes of High-End and Low-Cost Off-Line LED Drivers Under Accelerated Test Conditions</b> F. Keil, K. Hofmann <b>Paper ID: P210-201907310128 (Oral)</b>	231-234

<b>Sr. No.</b>	<b>Title</b>	<b>Page No.</b>
55	<b>Corrosion Failure Analysis and Coping Strategies of Light Reflecting Devices in Light-Emitting Diode Devices</b> Lyu Tiangang, Wang Yuefei, Lyu Henan, Wang Caixia, Chen Lihe, Xu Bingjian, Tang Leming, Ren Rongbin <b>Paper ID: P210-201909051759</b>	235-244
56	<b>Failure Analysis of Glass Transition Temperature of LED Insulation Layer</b> Yibin Wang, Fang Fang, Jing Wu, Kaixuan Lin, Tingting Xu, Weiqing Liang, Luqiao Yin <b>Paper ID: P210-201909121056</b>	245-248
57	<b>Intelligent Control Semiconductor Laser Reliability Test System</b> Xiaoling HU, Wensha LAN <b>Paper ID: P210-201909150809</b>	249-251
58	<b>Junction Temperature Prediction of the Multi-LED Module with the Modified Thermal Resistance Matrix</b> Fanny Zhao, Brian Shieh, Fangyun Zeng, Guoming Yang, S. W. Ricky Lee <b>Paper ID: P210-201909151656</b>	252-255
59	<b>Smart Lighting with Autonomous Color Tunability</b> Tianhang Zheng, Wujun, Zhixian Zhou, Wanghui Yan <b>Paper ID: P301-201909101118</b>	256-259
60	<b>Design of intelligent temperature control driving circuit for high power LED array</b> Fei Wang, Houda Zhou, Jingjing Liu, Luqiao Yin, Jianhua Zhang <b>Paper ID: P301-201909111644</b>	260-263
61	<b>Research on a Smart LED Lighting Based on Improved Flyback Driver</b> Wenran.Liu, Weiming.Lin <b>Paper ID: P301-201909151502</b>	264-268
62	<b>Analysis of Smart Wall Switch without Neutral Wire Compatibility Issue</b> Yang Hu, Wei Wen, Wanghui Yan and Ran Ding <b>Paper ID: P301-201909151630</b>	269-272
63	<b>A Wavelength Stabilized GaN based Laser Utilizing Distributed Bragg Reflector</b> Mingle Liao, Wuze Xie, Zejia Deng and Junze Li <b>Paper ID: P301-201909151659 (Oral)</b>	273-276
64	<b>Perovskite liquid quantum dots as a color converter for LD-based white lighting system for visible light communication</b> Shunming Liang, Zhou Lu, Xinrui Ding*, Jiexin Li, Yong Tang, Zongtao Li Binhai Yu <b>Paper ID: P301-201909162207</b>	277-279