

# 厦门大学物理学系

Department of Physics, Xiamen University



Chinese, Simplified  
English



姓名: [蔡端俊](#)

职称: 教授

办公室: 物理楼 405

Email: [dcai@xmu.edu.cn](mailto:dcai@xmu.edu.cn)

研究领域: 三维半导体、金属纳米线(柱)材料, 二维半导体薄层材料, 氮化物半导体LED结构器件, 先进纳米微观表

征技术,

生物蛋白质分子荧光材料研发, 微观结构材料模拟计算

## 教育和工作经历

2016 美国杜克大学化学系 高级访问学者

2015-至今 厦门大学物理科学与技术学院, 半导体光电子材料与高效转换器件协同创新中心, 教授 博导

2013 兼任台湾大学电机系、光电资讯工程研究所, 客座副教授。

2011-2012 厦门大学物理学系、半导体光子学研究中心, 副教授。

2009-2010 兼任法国里昂第一大学, 凝聚态及纳米材料研究中心, 博士后研究员。

2008-2009 葡萄牙国立科英布拉大学物理学系, 计算物理研究中心, 博士后研究员。

2007-2008 台湾大学物理学系, 博士后研究员。

2006 厦门大学物理学系凝聚态专业, 理学博士。

## 代表性文章或专著

F. P. Sun, Z. R. Hao, G. Z. Liu, C. P. Wu, S. Q. Lu, S. R. Huang, C. Liu, Q. M. Hong, X. H. Chen, D. J. Cai\*, and J. Y. Kang, “p-type conductivity of hexagonal boron nitride as dielectrically tunable monolayer: modulation doping with magnesium”, *Nanoscale* 10, 4361-4369 (2018).

Y. Y. Huang, Z. X. Huang, Z. B. Zhong, X. Yang, Q. M. Hong, H. C. Wang, S. R. Huang, N. Gao, X. H. Chen, D. J. Cai\*, and J. Y. Kang, “Highly transparent light emitting diodes on graphene encapsulated Cu nanowires network”, *Scientific Reports* 8, 13721 (2018).

Wael Z. Tawfik, Sung Oh Cho, Jun-Seok Ha, Sang-Wan Ryu, D. J. Cai, and June Key Lee, “Electrochemical Potentiostatic Activation Method for GaN-Based Green Vertical-LEDs”, *ECS Journal of Solid State Science and Technology* 7, Q47-Q51 (2018).

H. C. Wang, C. P. Wu, Y. Y. Huang, F. P. Sun, N. Lin, A. M. Soomro, Z. B. Zhong, X. D. Yang, X. H. Chen, J. Y. Kang, and D. J. Cai\*, “One-pot synthesis of superfine core-shell [Cu@metal](#) nanowires for highly tenacious transparent LED dimmer”, *ACS Applied Materials & Interfaces* 8, 28709 (2016).

C. P. Wu, A. M. Soomro, F. P. Sun, H. C. Wang, Y. Y. Huang, J. J. Wu, C. Liu, X. D. Yang, N. Gao, X. H. Chen, J. Y. Kang, and D. J. Cai\*, “Large-roll growth of 25-inch hexagonal BN monolayer film for self-release buffer layer of free-standing GaN wafer”, *Scientific Reports* 6, 34766 (2016).

T. C. Zheng, W. Lin, R. Liu, D. J. Cai, J. C. Li, S. P. Li and J. Y. Kang\*, “Improved p-type conductivity in Al-rich AlGa<sub>N</sub> using multidimensional Mg-doped superlattices”, *Scientific Reports* 6,

21897 (2016,).

H. M. Xu, H. C. Wang, C. P. Wu, N. Lin, A. M. Soomro, H. Z. Guo, C. Liu, X. D. Yang, Y. P. Wu, D. J. Cai\*, and J. Y. Kang, "Direct synthesis of graphene 3D-coated Cu nanosilks network for antioxidant transparent conducting electrode", *Nanoscale* 7, 10613–10621 (2015).

X. H. Chen, H. M. Xu, N. Lin, F. C. Xu, H. Y. Chen, D. J. Cai\* and J. Y. Kang, "Ideal square quantum wells achieved in AlGa<sub>N</sub>/Ga<sub>N</sub> superlattices using ultrathin blocking-compensation pair", *Applied Physics Letters* 106, 111604 (2015).

N. Lin, J. J. Wu, H. M. Xu, N. L. Liu, T. C. Zheng, W. Lin, C. Liu and D. J. Cai\*, "In situ self-release of thick Ga<sub>N</sub> wafer from sapphire substrate via graded strain field engineering", *Applied Physics Letters* 104, 012110 (2014).

H. Z. Guo, N. Lin, Y. Z. Chen, Z. W. Wang, Q. S. Xie, T. C. Zheng, N. Gao, S. P. Li, J. Y. Kang, D. J. Cai\* and D. L. Peng, "Copper Nanowires as Fully Transparent Conductive Electrodes", *Scientific Reports* 3, 2323 (2013).

D. J. Cai\*, M. A. L. Marques, and F. Nogueira, "Full Color Modulation of Firefly Luciferase through Engineering with Unified Stark Effect". *Journal of Physical Chemistry B* 117, 13725–13730 (2013).

W. Lin, W. Jiang, N. Gao, D. J. Cai\*, S. P. Li, and J. Y. Kang, "Optical isotropization of anisotropic wurtzite Al-rich AlGa<sub>N</sub> via asymmetric modulation with ultrathin (Ga<sub>N</sub>)<sub>m</sub>/(Al<sub>N</sub>)<sub>n</sub> superlattices", *Laser & Photonics Reviews* 7, 572 (2013).

B. B. Zhang, W. Lin, S. P. Li, Y. Zheng, Xu. Yang, D. J. Cai\*, and J. Y. Kang, "Ohmic contact to n-AlGa<sub>N</sub> through bonding state

transition at TiAl interface”, *Journal of Applied Physics* 111, 113710 (2012).

D. J. Cai, M. A. L. Marques and F. Nogueira, “Accurate color tuning of firefly chromophore by modulation of local polarization electrostatic fields”, *Journal of Physical Chemistry B* 115, 329 (2011).

D. J. Cai, F. C. Xu, J. C. Li, H. Y. Chen, and J. Y. Kang, “Non-contact nanoscale electrical measurements for embedded intrinsic charges by Auger electron spectroscopy”, *Nanotechnology* 21, 015707 (2010).

D. J. Cai, M. A. L. Marques, B. F. Milne and F. Nogueira, “Bio-heterojunction effect on fluorescence origin and efficiency improvement of firefly chromophores”, *Journal of Physical Chemistry Letters*, 1, 2781 (2010).

D. J. Cai, Y. Y. Huang, and H. C. Wang, 一种金属纳米线的透明薄膜LED调光器制备方法 (Fabrication method of transparent LED dimmer film with metal nanowires), China Invention Patent No. ZL201611211603.1 (Issued on Jan. 22, 2019) .

D. J. Cai, F. P. Sun, and A. M. Soomro, 一种透明柔性的压电式纳米发电机的制备方法 (Fabrication Method for flexible transparent piezoelectric nanogenerator), China Invention Patent No. ZL201710154030.1 (Issued on Jan. 09, 2019).

D. J. Cai, F. P. Sun, and A. M. Soomro, 一种衬底上直接生长氧化锌纳米柱阵列的方法 (Method for direct growth of ZnO nanorod array on arbitrary substrate), China Invention Patent No. ZL 201710154036.9 (Issued on Jan. 01, 2019).

D. J. Cai, 一种彩色轻质导电纺织线的制作方法 (Fabrication method for color light-weight conductive threads), China Invention

Patent No. ZL 201610843658.8 (Issued on Nov. 30, 2018) .

D. J. Cai, C. P. Wu, A. M. Soomro, and J. Y. Kang, 一种在基底上制备晶片级大尺寸六方氮化硼的方法 (Method for growth of wafer-scale hexagonal BN monolayer), China Invention Patent No. ZL201510039073.6 (Issued on Nov. 28, 2017).

D. J. Cai, H. C. Wang, N. Lin, H. M. Xu, C. P. Wu, J. Ma, H. Z. Guo, and J. Y. Kang, 一种合金包裹铜纳米线制备多功能核壳纳米材料的方法 (Coating technique of alloy on Cu nanowires for multifunctional core-shell nanostructures), China Invention Patent No. ZL201510385468.1 (Issued on Feb. 22, 2017).

D. J. Cai, A. M. Soomro, and C. P. Wu, H. M. Xu 一种直接在Si衬底上生长六方氮化硼二维薄膜的方法 (Method for direct growth of hexagonal BN 2D film on Si substrate), China Invention Patent ZL201410500423.X (Issued on Jun. 29, 2016).

D. J. Cai, H. M. Xu, Y. P. Wu, N. Lin and H. Z. Guo, 一种石墨烯碳膜包裹的铜纳米丝网络的制备方法 (Synthesis of Cu nanosilk networks capsulated by Graphene), China Invention Patent No. ZL201410327046.4 (Issued on Mar. 09, 2016).

D. J. Cai, X. H. Chen and J. Y. Kang, 一种陡峭界面GaN/AlGaN超晶格的制备方法 (A scheme to fabricate abrupt GaN/AlGaN superlattices), China Invention Patent No. ZL201310030135.8 (Issued on Mar. 04, 2015).

#### 科研基金

国家重点研发计划, “固态紫外光源量子应变体系结构设计及机理研”

国家自然科学基金, “核壳结构合金Cu纳米线合成及AlGaN基深紫外LED透明欧姆电极研究”

国家自然科学基金, “AlGaN 基量子阱的界面陡峭技术及其增强量子限制效应”

### 任教课程

《LED与光伏系统》专业选修课程、《半导体中的缺陷》专业选修课程、《半导体科学与技术讲座》专业选修课程、《国剧赏析》全校性通识课程、《行止天涯》全校性通识课程