

Zhihong Chen

School of Electrical and Computer Engineering, Purdue University
Birck Nanotechnology Center
1205 West State Street, West Lafayette, IN 47907
Tel: (765) 494-0772, Fax: (765) 496-8299
Email: zhchen@purdue.edu, Website: <http://web.ics.purdue.edu/~chen658>

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Education

BS, Physics	June 1998	Fudan University, China
MS, Physics	May 2002	University of Florida
PhD, Physics	Dec. 2003	University of Florida

Professional and Honorary Society Memberships

1. IEEE, Fellow

Honors and Awards

1. Forbes' Top 5 Nanotech Breakthroughs of 2006
2. Winner of the Industry Week's Technologies of the Year, 2006
3. Finalist of World Technology Award, Materials Category, 2006
4. IBM Research Achievement Award, 2006
5. Finalist of *Small Times* Best of Small Tech Awards, in the Category of Researcher of the Year, 2007
6. Intel Early Career Faculty Honor Program Award, 2012
7. Joel and Ruth Spira Excellence in Teaching Award, 2013
8. Excellence in Research Award, Purdue University Award for raising > US\$1M grants, 2013
9. Excellence in Research Award, Purdue University Award for raising > US\$1M grants, 2014
10. Purdue University Faculty Scholar, 2017-2022.
11. IEEE Fellow for "Contributions to the understanding and applications of low-dimensional nanomaterials", 2022 Class.

Professional Experience

Mar. 2004 – Mar. 2006	Postdoc Fellow , Nanometer Scale Science and Technology group at IBM T.J. Watson Research Center, Yorktown Heights, NY
Mar. 2006 – July 2008	Research Staff Member , Nanometer Scale Science and Technology group at IBM T.J. Watson Research Center, Yorktown Heights, NY
Aug. 2008 – Aug. 2010	Manager , Carbon Technology Group at IBM T.J. Watson Research Center, Yorktown Heights, NY
Oct. 2010 – April 2017	Associate Professor , School of Electrical and Computer Engineering, Purdue University, W. Lafayette, IN
April 2017 – present	Professor , School of Electrical and Computer Engineering, Purdue University, West Lafayette, IN
July 2019 – Dec. 2021	Associate Director of Research , Birck Nanotechnology Center, Purdue University, West Lafayette, IN
Jan. 2022 – Dec. 2022	Interim Director of Birck Nanotechnology Center, Purdue University, West Lafayette, IN
Jan. 2023 – present	Mary Jo and Robert L. Kirk Director of Birck Nanotechnology Center, Purdue University, West Lafayette, IN

Professional Society Activities

Organization:	American Physical Society
Activity:	Session Chair of Focus Session: Carbon Nanotubes: Mechanical Properties, APS annual meeting, 2005
Organization:	American Physical Society
Activity:	Session Chair of Focus Session: Graphene II, APS annual meeting, 2007
Organization:	Semiconductor Research Corporation (SRC)
Activity:	Member of NMS thrust TAB team on Patterning, 2006-2010
Organization:	International Roadmap for Semiconductors (ITRS)
Activity:	Member of the Emerging Research Materials Group, 2006-2010

Organization: Device Research Conference (DRC)
 Activity: Technical Program Committee, Rump Session Organizer, 2008-2010

Organization: IEEE International Electronic Device Meeting (IEDM)
 Activity: Solid State and Nano-electronics Subcommittee Member, Session Chair, 2009 – 2010

Organization: BIT's Annual World Congress of Nano-S&T
 Activity: Scientific Advisory Board Member, Session Chair, 2011

Organization: Materials Research Society
 Activity: Session Chair of EE: New Functional Nanocarbon Devices, MRS spring annual meeting, 2012

Organization: Oak Ridge National Laboratory, Center for Nanophase Materials Sciences
 Activity: Proposal Review Committee, 2014 – present

Organization: International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication
 Activity: Program Committee, 2014 – 2016

Organization: American Physics Society Annual March Meeting
 Activity: DMP focus session organizer, 2015 – present

Organization: Emerging Technologies CMOS conference
 Activity: 2D Materials session, 2016

Organization: Silicon Nanoelectronics Workshop
 Activity: Technical Program Committee, 2016

Organization: Device Research Conference
 Activity: Technical Program Committee, 2016 – present

Organization: IEEE International Electronic Device Meeting (IEDM)
 Activity: Solid State and Nano-electronics Subcommittee Member, Session Chair, 2018 – 2019

Organization: Device Research Conference
 Activity: Technical Program Committee, Vice Chair, 2018 – 2019

Organization: Device Research Conference
 Activity: Technical Program Committee, Chair, 2019 – 2020

Organization: International Interconnect Technology Conference

Activity: Technical Program Committee, 2018 – present. Workshop Chair for 2019-2020

Organization: Device Research Conference
Activity: Conference General Chair, 2021 – 2022

Organization: Device Research Conference
Activity: Board Member, 2021 – present

Organization: International Interconnect Technology Conference
Activity: Program Chair for 2021-2023

Organization: Symposium on VLSI Technology & Circuits
Activity: Technical Program Committee, 2022 – present

Organization: IEEE Andrew S. Grove Award Committee
Activity: Committee member, 2024

Organization: IEEE Frederick Philips Award Committee
Activity: Committee member, 2024

Master and PhD Thesis Students Currently Being Supervised

Tao Chu	Ph.D.	Oct. 2010 – July 2015 (Graduated)
Chia-Ching Lin	Ph.D.	Oct. 2010 – July 2015 (Graduated)
Ruchit Mehta	Ph.D.	May 2011 – July 2016 (Graduated)
Sunny Chugh	Ph.D.	Feb. 2012 – May 2017 (Graduated)
Yi-Tse Hung	Ph.D.	Nov. 2013 – Aug. 2019 (Graduated)
Punyashloka Debashis	Ph.D.	Aug. 2014 – Mar. 2020 (Graduated)
Chun-Li Lo	Ph.D.	Jan. 2016 – Aug. 2020 (Graduated)
Chin-Sheng Pang	Ph.D.	Aug. 2015 – Feb. 2021 (Graduated)
Suki Zhang	Ph.D.	May 2015 – May 2021 (Graduated)
Chin-Cheng Chiang	Ph.D.	Aug. 2019 – June 2022 (Graduated)
Xiangkai Liu	Ph.D.	Aug. 2018 – present
Daniel W. Eppler	Ph.D.	Aug. 2019 – present (co-advised)

Yuanqiu (Zoe) Tan	Ph.D.	Aug. 2020 – present
Hao-Yu Lan	Ph.D.	Aug. 2020 – present
Shao-Heng Yang	Ph.D.	Aug. 2021 – present
Xuejian Zhang	Ph.D.	Aug. 2021 – present (co-advised)

Postdoctoral Researchers Currently Being Supervised

Chih-Pin Lin	Oct. 2022 – Nov. 2023
Rahul Tripathi	Oct. 2021 – present
Himani Jawa	Oct. 2023 – present (co-advised)

Courses Developed or Significantly Revised

1. ECE 695: Principles and Methods of Nano-fabrication – Fall '11, Fall '13

Courses Regularly Taught

1. ECE 255: Electronic Circuit Analysis and Design – Spr. '11, Spr. '12, Fall '12, Spr. '13, Spr. '14, Fall '14, Fall '15, Spr. '16, Fall '16, Fall '17, Fall '18, Fall '20, Spr. '21
2. ECE 305: Semiconductor Devices – Spr. '18, Spr. '19, Fall '19, Fall '22, Fall '23
3. Vertically Integrated Projects: Semiconductors@Birck – Spr. '23, Fall '23, Spr. '24

School Committee Activities

Committee: Curriculum Committee
Activity: Member, 2011 - 2013

Committee: Graduate Admission Committee
Activity: Member, 2011 – present

Committee: Preeminent Team (Networked Wireless Nanoelectronic Implants)
Faculty Search Committee
Activity: Member, 2013 – 2016

Committee: Preeminent Team (Spintronics)
Faculty Search Committee

Activity: Member, 2014 – present

Committee: Engineering Faculty Conversation (Quantum and Nano in Engineering)

Activity: Facilitator, 2018 – 2019

Committee: ECE University Faculty Scholars and Rising Stars Committee

Activity: Chair, 2021 – present

Committee: ECE Department Chair Search Committee

Activity: Member, 2023

Committee: Movable Dream Hire Evaluation Committee for Semiconductors

Activity: Chair, 2023 -- present

Extracurricular Activities

Organization: Purdue Nano-Bio Student Symposium

Activity: Organizer (Co-organizer: T. Fisher) & Chair, Sep. 2011

Organization: Purdue University Chinese Engineering Student Council

Activity: Faculty Member, 2011 -- present

Organization: Nano-Bio Biweekly Faculty Discussion Group

Activity: Organizer, May, 2012 – 2013

Organization: NCN NEEDS Spintronics Summer School

Activity: Organizer, July 23-24, 2014

Organization: SRC nCORE NEW LIMITS Center

Activity: Center Director, 2018 – 2022

Organization: IEEE Andrew S. Grove Award Committee

Activity: Committee member, 2024

Organization: IEEE Frederick Philips Award Committee

Activity: Committee member, 2024

Journal Articles Published / Accepted (Total citation: 18,080; h-index: 48)

1. E. Farkas, M.E. Anderson, Z. Chen, A.G. Rinzler, " Length sorting cut single wall carbon nanotubes by high performance liquid chromatography," *Chemical Physics Letters*, Vol. **363**, 2002, p. 111

2. Z. Chen, X. Du, M. Du, D. Rancken, H. Cheng, A.G. Rinzler, " Bulk separative enrichment in metallic or semiconducting single-walled carbon nanotubes," *Nano Letters*, Vol. **3**, 2003, p. 1245
3. Z. Wu, Z. Chen*, X. Du, J. M. Logan, J. Sippel, M. Nikolou, K. Kamaras, J. R. Reynolds, D. B. Tanner, A. F. Hebard, A. G. Rinzler, " Transparent, conductive carbon nanotube films," *Science*, Vol. **305**, 2004, p. 1273 (*equal contribution)
4. K. Lee, Z. Wu, Z. Chen, F. Ren, S.J. Pearton, A.G. Rinzler, " Single wall carbon nanotubes for p-type ohmic contacts to GaN light-emitting diodes," *Nano Letters*, Vol. **4**, 2004, p. 911
5. S. Hershfield, Z. Chen, " Classical magnetoresistance in a curved wire," *J. Appl. Phys.* Vol. **97**, 2005, p. 10M105
6. Z. Chen, J. Appenzeller, J. Knoch, Y.-M. Lin, Ph. Avouris, " The role of metal-nanotube contact in the performance of carbon nanotube field-effect transistors," *Nano Letters*, Vol. **5**, 2005, p. 1497
7. Y.-M. Lin, J. Appenzeller, Z. Chen, Z.-G. Chen, H.-M. Cheng, Ph. Avouris, " High performance dual-gate carbon nanotube FETs with 40-nm gate length," *IEEE Electron Device Letters*, Vol. **26**, 2005, p. 823
8. J. Appenzeller, Y.-M. Lin, J. Knoch, Z. Chen, Ph. Avouris, " Comparing carbon nanotube transistors – the ideal choice: a novel tunneling device design," *IEEE Transaction on Electron Devices*, Vol. **52**, 2005, p. 2568
9. Z. Chen, J. Appenzeller, Y.-M. Lin, J. Sippel-Oakley, A. G. Rinzler, J. Tang, S. J. Wind, P. M. Solomon, Ph. Avouris, " An integrated logic circuit assembled on a single carbon nanotube," *Science*, Vol. **311**, 2006, p. 1735
10. F. Borondics, K. Kamaras, M. Nikolou, D.B. Tanner, Z. Chen, A.G. Rinzler, " Charge dynamics in transparent single-walled carbon nanotube films from optical transmission measurements," *Physical Review B*, Vol. **74**, 2006, p. 045431
11. Y.-M. Lin, J. Appenzeller, J. Knoch, Z. Chen, Ph. Avouris, " Low-frequency current fluctuations in individual semiconducting single-wall carbon nanotubes," *Nano Letters*, Vol. **6**, 2006, p. 930
12. J. Appenzeller, Y.-M. Lin, J. Knoch, Z. Chen, and Ph. Avouris, " 1/f noise in carbon nanotube devices - On the impact of contacts and device geometry," *IEEE Transactions on Nanotechnology*, Vol. **6**, 2007, p. 368
13. Y.-M. Lin, J. Appenzeller, Z. Chen, Ph. Avouris, " Electrical transport and 1/f noise in semiconducting carbon nanotube," *Physica E*, Vol. **37**, 2007, p. 72
14. Z. Chen, Y.-M. Lin, M. J. Rooks, Ph. Avouris, " Graphene nano-ribbon electronics," *Physica E*, Vol. **40**, 2007, p. 228

15. Ph. Avouris, Z. Chen, V. Perebeinos, " Carbon based electronics," *Nature Nanotechnology*, Vol. **2**, 2007, p. 605
16. G. S. Tulevski, J. Hannon, A. Afzali, Z. Chen, Ph. Avouris, and C. R. Kagan, " Chemically assisted directed assembly of carbon nanotubes for the fabrication of large-scale device arrays," *J. Am. Chem. Soc.*, Vol. **129**, 2007, p. 11964
17. Y.-M. Lin, V. Perebeinos, Z. Chen, Ph. Avouris, " Electrical observation of subband formation in graphene nanoribbons," *Phys. Rev. B*, Vol. **78**, 2008, p. 161409
18. R.M. Tromp, A. Afzali, M. Freitag, D. Mitzi, Z. Chen, " Novel strategy for diameter-selective separation and functionalization of single-wall carbon nanotubes," *Nano Letters*, Vol. **8**, 2008, p. 469
19. Z. Chen, D. Farmer, S. Xu, R. Gordon, Ph. Avouris, J. Appenzeller, " Externally assembled gate-all-around carbon nanotube field-effect transistor," *IEEE Electron Device Letters*, Vol. **29**, 2008, p. 183
20. M. Freitag, M. Steiner, Y. Martin, V. Perebeinos, Z. Chen, J. C. Tsang, Ph. Avouris, " Energy dissipation in graphene field-effect transistors," *Nano Lett.* Vol. **9**, 2009, p. 1883
21. A. D. Franklin, A. Lin, P. Wong, and Z. Chen, " Current scaling in aligned carbon nanotube array transistors with local bottom gating," *IEEE Electron Device Letters*, Vol. **31**, 2010, p. 644
22. C. Dimitrakopoulos, Y.-M. Lin, A. Grill, D.B. Farmer, M. Freitag, Y. Sun, S.-J. Han, Z. Chen, K. A. Jenkins, Y. Zhu, Z. Liu, T.J. McArdle, J.A. Ott, R. Wisnieff, and Ph. Avouris, " Wafer-scale epitaxial graphene growth on the Si-face of hexagonal SiC (0001) for high frequency transistors," *J. Vac. Sci. & Tech. B*, Vol. **28**, 2010, p. 985
23. A. D. Franklin and Z. Chen, " Length scaling of carbon nanotube transistors," *Nature Nanotechnology*, **5**, 2010, p. 858
24. S. Oida, F.R. McFeely, J.B. Hannon, R.M. Tromp, M. Copel, Z. Chen, Y. Sun, D.B. Farmer, J. Yurkas, " Decoupling graphene from SiC(0001) via oxidation," *Phys. Rev. B*, **82**, 2010, p. 041411
25. S.-J. Han, Z. Chen, A. A. Bol, and Y. Sun, " Channel-length dependent transport behaviors of graphene field-effect transistors," *IEEE Electron Device Letters*, Vol. **32**, 2011, p. 812
26. J. Knoch, Z. Chen, and J. Appenzeller " Properties of metal-graphene contacts," *IEEE Transactions on Nanotechnology*, **11**, 2012, p. 513

27. C.-C. Lin, A.V. Penumatcha, Y. Gao, V. Q. Diep, J. Appenzeller, Z. Chen, "Spin Transfer Torque in a Graphene Lateral Spin Valve Assisted by an External Magnetic Field," *Nano Letters*, **13**, 2013, p. 5177
28. T. Chu, Z. Chen, "Understanding the Electrical Impact of Edge Contacts in Few-Layer Graphene," *ACS Nano*, **8**, 2014, p. 3584
29. C.-C. Lin, Y. Gao, A.V. Penumatcha, V. Q. Diep, J. Appenzeller, Z. Chen, "Improvement of Spin Transfer Torque in Asymmetric Graphene Devices," *ACS Nano*, **8**, 2014, p. 3807
30. Z. Chen, H.-S. Wong, S. Mitra, A. Bol, L. Peng, G. Hills and N. Thissen, "Carbon Nanotube for High-performance Logic," *MRS Bulletin*, **39**, 2014, p. 719
31. S. Chugh, M. Man, Z. Chen, K. Webb, "Ultra-Dark Graphene Stack Metamaterials," *Applied Physics Letters*, **106**, 2015, p. 061102
32. R. Mehta, S. Chugh, Z. Chen, "Enhanced Electrical and Thermal Conduction in Graphene-Encapsulated Copper Nanowires," *Nano Letters*, **15**, 2015, p. 2024
33. S. Chugh, R. Mehta, N. Lu, F.D. Dios, M.J. Kim, Z. Chen, "Comparison of Graphene Growth on Arbitrary Non-Catalytic Substrates Using Low-Temperature PECVD," *Carbon*, **93**, 2015, p. 393
34. T. Chu, Z. Chen, "Achieving Large Transport Bandgaps in Bilayer Graphene," *Nano Research*, **8**, 2015, p. 3228
35. A.V. Penumatcha, C.-C. Lin, V.Q. Diep, S. Datta, J. Appenzeller, Z. Chen, "Impact of Scaling on the Dipolar Coupling in Magnet-Insulator-Magnet Structures," *IEEE Trans. Magnetics*, **52**, 2015, p. 3400207
36. A.V. Penumatcha, S.R. Das, Z. Chen, J. Appenzeller, "Spin-torque switching of a Nano-magnet Using Giant Spin Hall Effect," *AIP Advances*, **5**, 2015, p. 107144
37. T. Chu, H. Ilatikhameneh, G. Klimeck, R. Rahman, Z. Chen, "Electrically Tunable Bandgaps in Bilayer MoS₂," *Nano Lett.*, **15**, 2015, p. 8000
38. F. Chen, H. Ilatikhameneh, G. Klimeck, Z. Chen, R. Rahman, "Configurable Electrostatically Doped High Performance Bilayer Graphene Tunnel FET," *IEEE J. EDS*, **4**, 2016, p. 124
39. S. Chugh, R. Mehta, M. Man, Z. Chen, "Optical Relaxation Time Enhancement in Graphene-Passivated Copper Films," *Scientific Reports*, **6**, 2016, p. 30519
40. A.J.M. Mackus, N.F.W. Thissen, J.J.L. Mulders, P.H.F. Trompenaars, Z. Chen, W.M.M. Kessels, A.A. Bol, "Resist-free Fabricated Carbon Nanotube Field-effect Transistors with High-quality Atomic-layer-deposited Platinum Contacts," *APL*, **110**, 2017, p. 013101. DOI: <http://dx.doi.org/10.1063/1.4973359>

41. R. Mehta, S. Chugh, Z. Chen, "Transfer-free Multi-layer Graphene as a Diffusion Barrier," *Nanoscale*, **9**, 2017, p. 1827.
42. C.-L. Lo, M. Catalano, K.K.H. Smith, L. Wang, S. Zhang, E. Pop, M.J. Kim and Z. Chen, "Studies of Two-dimensional h-BN and MoS₂ for Potential Diffusion Barrier Application in Copper Interconnect Technology," *Nature npj 2D Materials and Applications*, **1:42**, 2017. Doi: 10.1038/s41699-017-0044-0
43. C.J. Benjamin, S. Zhang, Z. Chen, "Controlled Doping of Transition Metal Dichalcogenides by Metal Workfunction Tuning in Phthalocyanine Compounds," *Nanoscale*, **10**, 2018, p. 5148. DOI: 10.1039/C7NR08497H
44. C. -L. Lo, K. Zhang, R. S. Smith, K. Shah, J. A. Robinson, Z. Chen, "Large-Area, Single-Layer Molybdenum Disulfide Synthesized at BEOL Compatible Temperature as Cu Diffusion Barrier," *IEEE Electron Device Letters*, **39**, 2018, p. 873-876
45. Z. Lin, et al., "Recent Progress on 2D Materials Beyond Graphene: From Ripples, Defects, Intercalation, and Valley Dynamics, to Straintronics, and Power Dissipation," *AIP APL Materials*, **6**, 2018, p. 080701
46. P. Debashis, Z. Chen, "Experimental Demonstration of a Spin Logic Device with Deterministic and Stochastic Mode of Operation," *Scientific Reports*, **8**, 2018, p.11405
47. P. Debashis, R. Faria, K. Y. Camsari, Z. Chen, "Designing Stochastic Nanomagnets for Probabilistic Spin Logic," *IEEE Magnetism Letters*, **9**, 2018, p. 4305205
48. V. Ostwal, P. Debashis, R. Faria, Z. Chen, J. Appenzeller, "Spin-torque Devices with Hard Axis Initialization as Stochastic Binary Neurons", *Scientific Reports*, **8**, 2018, p.16689
49. T. Y. T. Hung, K. Y. Camsari, S. Zhang, P. Upadhyaya, Z. Chen, "Direct Observation of Valley Coupled Topological Current in MoS₂," *Science Advances*, **5**, 2019, eaau6478
50. H. Park, S. Zhang, A. Steinman, Z. Chen, H. Lee, "Graphene Prevents Neurostimulation-induced Platinum Dissolution in Fractal Microelectrodes, " *2D Materials*, **6**, 2019, p.035037
51. C.-L. Lo, M. Catalano, A. Khosravi, W. Ge, Y. Ji, D. Y. Zemlyanov, L. Wang, R. Addou, Y. Liu, R. M. Wallace, M. J. Kim, and Z. Chen, "Enhancing Interconnect Reliability and Performance by Converting Tantalum to 2D Layered Tantalum Sulfide at Low Temperature," *Advanced Materials*, **31**, 2019, p.1902397

52. Rui Zhao, Chun-Li Lo, Fu Zhang, Ram Krishna Ghosh, Theresia Knobloch, Mauricio Terrones, Zhihong Chen, Joshua Robinson, "Incorporating Niobium in MoS₂ at BEOL-Compatible Temperatures and its Impact on Copper Diffusion Barrier Performance," *Advanced Materials Interfaces*, **6**, 2019, p. 1901055
53. T. Shen, D. Valencia, Q. Wang, K. Wang, M. Povolotskyi, M. J. Kim, G. Klimeck, Z. Chen, J. Appenzeller, "MoS₂ for Enhanced Electrical Performance of Ultrathin Copper Films," *ACS Applied Materials and Interfaces*, **11**, 2019, p. 28345
54. C.-S. Pang, C.-Y. Chen, T. Ameen, S. Zhang, H. Ilatikhameneh, R. Rahman, G. Klimeck, and Z. Chen, "WSe₂ Homojunction Devices: Electrostatically Configurable as Diodes, MOSFETs, and Tunnel FETs for Reconfigurable Computing," *Small*, **15**, 2019, p.1902770
55. Yuqiang Zeng, Chun-Li Lo, Shengjiao Zhang, Zhihong Chen, Amy Marconnet, "Dynamically Tunable Thermal Transport in Polycrystalline Graphene by Strain Engineering," *Carbon*, **158**, 2020, p.63-68
56. T.Y.T. Hung, A. Rustagi, S. Zhang, P. Upadhyaya, Z. Chen, "Experimental Observation of Coupled Valley and Spin Hall Effect in p-doped WSe₂ Devices", *InfoMat*, **2**, 2020, p.968-974. DOI: 10.1002/inf2.12095
57. C.-S. Pang, T.Y.T. Hung, A. Khosravi, R. Addou, Q. Wang, M.J. Kim, R.M. Wallace, Z. Chen, "Atomically Controlled Tunable Doping in High Performance WSe₂ Devices," *Advanced Electronic Materials*, **6**, 2020, p.1901304
58. P. Debashis, R. Faria, K.Y. Camsari, S. Datta, Z. Chen, "Correlated Fluctuations in Spin Orbit Torque-coupled Perpendicular Nanomagnets," *Phys. Rev. B*, **101**, 2020, p.094405
59. P. Debashis, T.Y.T. Hung, Z. Chen, "Monolayer WSe₂ Induced Giant Enhancement in the Spin Hall Efficiency of Tantalum", *Nature npj 2D Materials and Applications*, 4:18, 2020
60. C.-L. Lo, B. A. Helfrecht, Y. He, D. M. Guzman, N. Onofrio, S. Zhang, D. Weinstein, A. Strachan, Z. Chen, "Opportunities and challenges of 2D materials in back-end-of-line interconnect scaling", *Journal of Applied Physics*, **128**, 2020, p. 080903 (Editor's Pick)
61. C.-S. Pang, T. Y.T. Hung, A. Khosravi, R. Addou, R. M. Wallace, and Z. Chen, "Doping-Induced Schottky- Barrier Realignment for Unipolar and High Hole Current WSe₂ Devices with 10⁸ On/off Ratio," *IEEE EDL*, **41**, 2020, p.1122
62. Kerem Y. Camsari, Punyashloka Debashis, Vaibhav Ostwal, Ahmed Zeeshan Pervaiz, Tingting Shen, Zhihong Chen, Supriyo Datta, Joerg Appenzeller, "From Charge to Spin and Spin to Charge: Stochastic Magnets for Probabilistic Switching," *Proceedings of IEEE*, **108**, 2020, p.1322

63. P. Debashis, V. Ostwal, R. Faria, S. Datta, J. Appenzeller, Z. Chen, "Hardware Implementation of Bayesian Network Building Blocks with Stochastic Spintronic Devices," *Scientific Reports*, **10**, 2020, p.16002
64. Suki Zhang, Arfaei Babak, Zhihong Chen, "Friction Force Reduction for Electrical Terminals Using Graphene Coating," *Nanotechnology*, **32**, 2020, p. 035704
65. Sandeep Thirumala, Yi-Tse Hung, Shubham Jain, Arnab Raha, Niharika Thakuria, Vijay Raghunathan, Anand Raghunathan, Zhihong Chen, Sumeet Gupta, "Valley-coupled-spintronic Non-volatile Memories with Compute-in-memory Support," *IEEE Trans. Nano.* **19**, 2020, p. 635; DOI: 10.1109/TNANO.2020.3012550.
66. Chin-Cheng Chiang, Vaibhav Ostwal, Peng Wu, Chin-Sheng Pang, Feng Zhang, Zhihong Chen, and Joerg Appenzeller, "Memory Applications from 2D Materials", *Appl. Phys. Rev.*, **8**, 2021, p.021306, DOI: 10.1063/5.0038013
67. C.-S. Pang, P. Wu, J. Appenzeller, Z. Chen, "Thickness-dependent Study of WS₂-FETs with Ultra-scaled Channel Lengths", *IEEE Trans. Elec. Dev.*, **68**, 2021, p. 2123
68. C.-S. Pang, S.-J. Han, Z. Chen, "Steep Slope Carbon Nanotube Tunneling Field-effect Transistor," *Carbon*, **180**, 2021, p.237
69. Chin-Sheng Pang, Ruiping Zhou, Xiangkai Liu, Peng Wu, Terry Hung, Shiqi, Guo, Mona, Zaghoul, Sergiy Krylyuk, Albert V. Davydov, Joerg Appenzeller, Zhihong Chen, "Mobility Extraction in 2D Transition Metal Dichalcogenide Devices – On the Importance of Gate Modulated Contact Resistance," *Small*, **17**, 2021, p.2100940
70. Hossein Pourmeidani, Punyashloka Debashis, Zhihong Chen, Ronald F. DeMara, "Process Variation Sensitivity of Spin Orbit Torque Perpendicular Nanomagnets in DBNs", *IEEE Tran. Mag.*, **57**, 2021, p.3401508
71. Daniel Gall, Judy J. Cha, Zhihong Chen, Hyeuk-Jin Han, Christopher Hinkle, Joshua A. Robinson, Ravishankar Sundararaman, Riccardo Torsi, "Materials for Interconnects," *MRS Bulletin*, **46**, 2021, p959
72. S. Das, A. Sebastian, E. Pop, C. J. McClellan, A. D. Franklin, T. Grasser, T. Knobloch, Y. Illarionov, A. V. Penumatcha, J. Appenzeller, Z. Chen, W. Zhu, I. Asselberghs, L.-J. Li, U. E. Avci, N. Bhat, T. D. Anthopoulos, R. Singh, "Transistor Based on Two-dimensional Materials for Future Integrated Circuits," *Nature Electronics*, **4**, 2021, p. 786
73. Karam Cho, Xiangkai Liu, Zhihong Chen, Sumeet Kumar Gupta, "Utilizing Valley Spin Hall Effect in Monolayer WSe₂ for Designing Low Power Non-Volatile Spintronic Devices and Flip-Flops," *IEEE Tran. Elec. Dev.* **69**, 2022, p.1667

74. Chin-Cheng Chiang, Hao-Yu Lan, Chin-Sheng Pang, Joerg Appenzeller, Zhihong Chen, "Air-stable P-doping in Record High-performance Monolayer WSe₂ Devices", *IEEE Elec. Dev. Lett.*, **43**, 2022, p.319
75. P. Debashis, A. K. Maskay, P. Upadhyaya, Z. Chen, "Spin-Orbit Torque Controlled Stochastic Oscillators with Synchronization and Frequency Tunability", *Journal of Applied Physics*, **131**, 2022, p.123901
76. Abhishek Bharatbhai Solanki, Simeon I Bogdanov, Avinash Rustagi, Neil R Dilley, Tingting Shen, Mohammad Mushfiqur Rahman, Wenqi Tong, Punyashloka Debashis, Zhihong Chen, Joerg Appenzeller, Yong P Chen, Vladimir M Shalaev, Pramey Upadhyaya, "Electric Field Control of Interaction Between Magnons and Quantum Spin Defects," *Physical Review Research*, **4**, 2022, p.L012025
77. Z. Cheng, C.-S. Pang, P. Wang, Y. Wu, D. Shahrjerdi, I. Radu, M. Lemme, L.-M. Peng, X. Duan, Z. Chen, J. Appenzeller, S. Koester, E. Pop, A. Franklin, C. Richter, "How to Report and Benchmark Emerging Field-effect Transistors," *Nature Electronics*, **5**, 2022, p.416
78. Z. Sun, C.-S. Pang, P. Wu, T.Y.T Hung, M.-Y Li, S. L. Liew, C.-C. Cheng, H. Wang, H.-S. Wong, L.-J. Li, I. Radu, Z. Chen, J. Appenzeller, "Statistical Assessment of High-Performance Scaled Double-Gate Transistors from Monolayer WS₂," *ACS Nano*, **16**, 2022, p.14942
79. Z. Chen, "Gate-all-around Nanosheet Transistors Go 2D", *Nature Electronics*, **5**, 2022, p.830
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83. S. Rakheja, Z. Chen, C.-T. Chen, "Dimensional Scaling of Material Functional Properties to meet Back-End-of-Line (BEOL) Challenges", *Applied Physics Letters*, **123**, 2023, p.030401

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Conference Proceedings and Presentations

1. Z. Chen, Z. C. Wu, J. Sippel and A. G. Rinzler, "Metallic/semiconducting nanotube separation and ultra-thin, transparent nanotube films," *Proceedings of Electric Properties of Synthetic Nanostructures: XVII International Winter School on the Electronic Properties of Novel Materials, American Institute of Physics*, 2004, 723, p. 69-74
2. F. Borondics, K. Kamaras, Z. Chen, A.G. Rinzler, M. Nikolou, D.B. Tanner, "Wide range optical studies on transparent SWNT films," *Proceedings of Electric Properties of Synthetic Nanostructures: XVII International Winter School on the Electronic Properties of Novel Materials, American Institute of Physics*, 2004, 723, p. 137-140
3. J. Knoch, S. Mantl, Y.-M. Lin, Z. Chen, Ph. Avouris, J. Appenzeller, "An extended model for carbon nanotube field-effect transistors," *IEEE Device Research Conference Digest*, 2004, p. 135-136
4. Z. Chen, J. Appenzeller, J. Knoch, Y.-M. Lin, Ph. Avouris, "Impact of the nanotube diameter on the performance of CNFETs," *IEEE Device Research Conference Digest*, 2005, p. 237-238
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21. A. Prakash, S. Das, R. Mehta, Z. Chen, J. Appenzeller, "Ionic gated WSe₂ FETs: Towards Transparent Schottky Barriers," *IEEE Device Research Conference*, 2014, p. 129-130
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24. R. Mehta, S. Chugh, Z. Chen, "Graphene-Encapsulated Copper Nanowires For Improved Thermal Management of Interconnects," *International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems (InterPACK)*, 2015, p. 48359, 2 pages
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30. R. Mehta, S. Chugh, Z. Chen, "Graphene For Next Generation Interconnects Applications," *Carbon*, July 10-15, State College, PA, 2016
31. T. Chu, Z. Chen, "Electrically Tunable Bandgaps in 2D Layered Materials," *IEEE EDSSC*, Aug. 3-5, Hong Kong, 2016, page 25-29. DOI: 10.1109/EDSSC.2016.7785202

32. C. -L. Lo, R. Mehta, S. Chugh, Z. Chen, "Atomically Thin Diffusion Barriers for Ultra-Scaled Cu Interconnects," *Microelectronics Integrity Meeting*, Poster Contest First Place Award, July 25-30, Indianapolis, IN, 2016
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34. P. Debashis, R. Faria, K. Y. Camsari, J. Appenzeller, S. Datta, Z. Chen, "Experimental Demonstration of Nanomagnet Networks as Hardware for Ising Computing," *IEEE International Electron Devices Meeting (IEDM) Proceeding*, paper 34.3 (2016)
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36. C. -L. Lo, S. Zhang, T. Shen, J. Appenzeller, Z. Chen, "BEOL Compatible 2D Layered Materials as Ultra-Thin Diffusion Barriers for Cu Interconnect Technology," *IEEE Device Research Conference*, 2017.
37. C. -S. Pang, H. Ilatikhameneh, Z. Chen, "Gate Tunable 2D WSe₂ Esaki Diode by SiNx Doping," *IEEE Device Research Conference*, 2017.
38. S. N. Zhang, C. J. Benjamin, Z. Chen, "Molecular Doping of Transition Metal Dichalcogenides using Metal Phythalocyanines," *IEEE Device Research Conference*, 2017
39. C. -L. Lo, M. Catalano, K.K.H. Smithe, L. Wang, E. Pop, M.J. Kim, Z. Chen, "On the Potential of 2D Layered Materials as Diffusion Barriers for Cu Interconnect Technology," *TECHCON*, Sept. 10-12, 2017, Austin, TX (Best in Session Award)
40. C. -L. Lo, K. Zhang, J. A. Robinson, Z. Chen, "BEOL Compatible Sub-nm Diffusion Barrier for Advanced Cu Interconnects," *IEEE VLSI-TSA*, 2018. (Best Student Paper Award)
41. C.-S. Pang, Z. Chen, "First Demonstration of WSe₂ CMOS Inverter with Modulable Noise Margin by Electrostatic Doping", *IEEE Device Research Conference*, 2018
42. P. Debashis, Z. Chen, "Tunable Random Number Generation Using Single Superparamagnet with Perpendicular Magnetic Anisotropy," *IEEE Device Research Conference*, 2018
43. C.-S. Pang, N. Thakuria, S. Gupta, Z. Chen, "First Demonstration of WSe₂ Based CMOS-SRAM", *IEEE International Electron Devices Meeting (IEDM) Proceeding*, 2018

44. H. Park, S. Zhang, A. Steinman, Z. Chen, H. Lee, "Graphene Prevents Neurostimulation-induced Corrosion of Pt-based Microelectrodes," *9th International IEEE/EMBS Conference on Neural Engineering*, 2019
45. C.-L. Lo, H. Li, W. Ge, C. H. Naylor, X. Zhao, Y. Liu, K. Lin and Z. Chen, "Replacing TaN/Ta Bilayer with 2D Layered TaS₂ Converted from Ta for Interconnects at Sub-5 nm Technology Nodes," *IEEE IITC / MAM Conference*, 2019 (S.C. Sun Best Student Paper Award)
46. T. Y.T. Hung, C.-S. Pang, X. Liu, D. Zemlyanov and Z. Chen, "Atomically Thin p-doping Layer and Record High Hole Current on WSe₂," *IEEE Device Research Conference*, 2019
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49. K. Cho, S. K. Thirumala, X. Liu, N. Thakuria, Z. Chen, S. K. Gupta, "Utilizing Valley-Spin Hall Effect in WSe₂ for Low Power Non-Volatile Flip-Flop Design", *IEEE Device Research Conference*, 2020
50. Hossein Pourmeidani, Punyashloka Debashis, Zhihong Chen, Ronald F. DeMara, "Electrically-Tunable Stochasticity for Spin-Based Neuromorphic Circuits: Self-Adjusting to Variation", *IEEE International Midwest Symposium on Circuits & Systems*, Aug. 9-12, 2020
51. C.-S. Pang, P. Wu, J. Appenzeller, Z. Chen, "Sub-1nm EOT WS₂-FET with I_{DS} > 600μA/μm at V_{DS}=1V and SS < 70mV/dec at L_G=40nm", *IEEE International Electron Devices Meeting (IEDM) Proceeding*, 2020
52. P. Wu, R. Zhou, C. S. Pang, X. Liu, Z. Chen, J. Appenzeller, Contact Resistance Model for WSe₂ Schottky-Barrier FET - *IEEE Device Research Conference*, 2020
53. S. N. Zhang, B. Arfaei, Z. Chen, "Friction Force Reduction in Electrical Terminals with Solution-Processed Reduced Graphene Oxide Coating", WCX SAE World Congress, 2021
54. S. N. Zhang, B. Arfaei, Z. Chen, "Graphene Coating as a Corrosion Protection Barrier for Metallic Terminals in Automotive Environments", WCX SAE World Congress, 2021
55. X. Chen, C.-L. Lo, M.C. Johnson, Z. Chen, S.K. Gupta, "Modeling and Circuit Analysis of Interconnects with TaS₂ Barrier/Liner", *IEEE Device Research Conference*, 2021

56. C. Chiang, J. Appenzeller, Z. Chen, "Novel RRAM Technology from 2D Materials," *TECHCON*, 2021
57. H.-Y. Lan, J. Appenzeller, Z. Chen, "Dielectric Interface Engineering for High-Performance Monolayer MoS₂ Transistors via hBN Interfacial Layer and Ta Seeding", *IEDM 2022*
58. Z. Sun, C. Chen, J.A. Robinson, Z. Chen, J. Appenzeller, "A Mobility Study of Monolayer MoS₂ on Low-k/High-k Dielectrics", *Device Research Conference*, 2023
59. H.-Y. Lan, R. Tripathi, X. Liu, J. Appenzeller, and Z. Chen, "Wafer-scale CVD Monolayer WSe₂ p-FETs with Record-high 727 μ A/ μ m I_{on} and 490 μ S/ μ m g_{max} via Hybrid Charge Transfer and Molecular Doping", *IEDM 2023*

Invited Lectures

1. "Carbon nanotubes – from devices to integrated circuits," Invited seminar, Electrical and Computer Engineering Department, Rutgers University, Piscataway, NJ, Feb. 15, 2006.
2. "Carbon nanotubes – from devices to integrated circuits," Invited talk, CNST nanotechnology workshop, UIUC, Urbana, IL, May 4 - 5, 2006
3. "Carbon nanotubes – from devices to integrated circuits," Invited talk, AVS, New England Chapter local symposium, Burlington, MA, May 22, 2006
4. "Carbon nanotube electronics," *Electronic Processes in Organic Materials*, Invited talk, Gordon Conference, Mount Holyoke College, MA, July 30 - Aug 4, 2006
5. "Gate work function engineering for nanotube based circuits," Invited talk, IEEE International Solid-State Circuit Conference, San Francisco, CA, Feb. 11, 2007
6. "Carbon electronics," Invited talk, Winter School on the Electronic Properties of Novel Electronic Materials, Kirchberg, Austria, March 16, 2007
7. "Carbon electronics development," Invited talk, DARPA carbon electronics for RF applications work shop, Washington DC, April, 2007
8. "Nano-materials for nano-electronics," Invited seminar, Electrical Engineering department, Purdue University, West Lafayette, IN, December, 2007
9. "Nano-materials for nano-electronics," Invited talk, The 35th Conference on the Physics and Chemistry of Surfaces and Interfaces, Santa Fe, NM, Jan., 2008

10. "Carbon nano-electronics," Invited seminar, Columbia University, New York, NY, April, 2008
11. "Carbon nano-electronics," Invited seminar, Notre Dame University, South Bend, IN, May, 2008
12. "Carbon nano-electronics," Invited talk, The 1st FoNE conference, Taromina, Italy, June, 2008
13. "Carbon nano-electronics," Invited talk, Young Engineering Scientist Symposium, Washington, DC, July, 2008
14. "Self-assembly and top-down patterning for nano-electronics," Invited talk, DARPA-ARL-AMRDEC nano-electronics for RF and electronics applications workshop, Adelphi, MD, Aug., 2008
15. "Carbon nano-electronics," Invited talk, The International Symposium on Compound Semiconductors, Rust, Germany, Sept., 2008
16. "Nano-electronics – more than just small," Invited seminar, Columbia University, New York, NY, Oct., 2008
17. "Carbon nano-electronics," Invited talk, CSTIC, Shanghai, China, March, 2010
18. "Graphene transport," Invited seminar, Rochester Institute of Technology, May, 2010
19. "Scaling in carbon electronics," Invited talk, EIPBN, Anchorage, Alaska, June, 2010
20. "Understanding the transport in graphene field-effect transistors," Invited talk, 457. WE-Heraeus-Seminar on "Graphene Electronics – Material, Physics and Devices", Bonn, Germany, August, 2010
21. "Journey along the carbon road," Invited seminar, NASA Goddard Space Flight Center, Greenbelt, MD, August, 2011
22. "Journey along the carbon road," Invited seminar, Condense Matter Physics Seminar, Physics Department, Purdue University, Sep. 2, 2011
23. "Understanding the transport in graphene field-effect transistors," Invited talk, BIT's 1st Annual World Congress of Nano-S&T, Dalian, China, October, 2011
24. "Path to High Performance Graphene Devices," Invited talk, Materials Research Society Spring Meeting, San Francisco, CA, April, 2012
25. "Nanowire for interconnects applications," Invited talk, SRC GRC Interconnects Workshop, Stanford University, CA, June 18, 2012

26. "Graphene Platform for Bio-sensing & Neuro-electronic Interface Applications," Invited talk, 10th Annual World Congress of Society for Brain Mapping & Therapeutics, Baltimore, MD, May 14, 2013
27. "The Use of Multi-layer Graphene," Invited talk, 2013 CMOS Emerging Technologies Research Symposium, Whistler, BC, Canada, July 17, 2013
28. "Spin Transfer Torque in Graphene Lateral Spin Valve," Invited talk, Nanoelectronics Research Initiative e-workshop, Nov. 12, 2013
29. "Tunable Bandgap and Edge Contacts in Bilayer Graphene," Invited talk, CIMTEC 6th Forum on New Materials, Montecatini Terme, Italy, June 17, 2014
30. "Spin Transfer Torque in Graphene Lateral Spin Valve," Invited talk, icps, Austin, TX, August 11, 2014
31. "Dipolar Coupling in Scaled Nano-magnets for Spin Logic Applications," Invited talk, Nanoelectronics Research Initiative e-workshop, Oct. 21, 2014
32. "Low Dimensional Materials for Electronic and Spintronic Applications," Invited seminar, Open Research Seminar Series, University of Louisville, Louisville, KY, Mar. 30, 2015
33. "Low Dimensional Materials for Electronic and Spintronic Applications," Invited seminar, University of Texas at Austin, Austin, TX, May 6, 2015
34. "Low Dimensional Materials for Electronic and Spintronic Applications," Invited seminar, Harvard University, Cambridge, MA, May 12, 2015
35. "Graphene Based All Spin Logic," Invited talk, International Symposium on Physics and Device Applications of 2D Materials, Nanjing University, China, July 12-15, 2015
36. "Improved Electrical and Thermal Performance and Ultra-thin Diffusion Barrier in Copper-Graphene Hybrid Interconnects," Invited talk, 32nd Annual Advanced Metallization Conference, Austin, TX, Sept. 9-11, 2015
37. "Bandgap Engineering in 2D Layered Materials," Invited talk, Steep Transistor Workshop, Notre Dame, IN, Oct. 6, 2015
38. "Field Controlled Bandgaps in 2D Layered Materials," Invited talk at IEDM, Washington DC, Dec. 9, 2015
39. "Graphene for Next Generation Interconnects Applications," Invited talk at Carbon, Penn State University, PA, July 10-15, 2016

40. "Electrically Tunable Bandgaps in 2D Layered Materials," Invited talk at IEEE Interactional Conference on Electron Devices and Solid-State Circuits (EDSSC'16), Hong Kong, Aug. 3-5, 2016
41. "Low Dimensional Materials for Electronic and Spintronic Applications," Invited seminar, Physics Department, Brown University, Oct. 27, 2016
42. "Nanomagnet Networks as Building Blocks for Ising Computing," Invited talk, International Conference on Computer-Aided Design, Austin, TX, Nov. 7-10, 2016
43. "2D Diffusion Barriers for Ultra-scaled Interconnects Technology," Invited talk, Graphene and Beyond Workshop, Penn State University, PA, May 11, 2017
44. "Nanomagnet Networks as Building Blocks for Ising Computing," Invited talk, ETCMOS, Warsaw, Poland, May 29, 2017
45. "PMA-IMA Based CSL Implementation and A Building Block for Probabilistic Spin Logic," Invited talk, Nanoelectronics Research Initiative e-workshop, July 11, 2017
46. "2D Diffusion Barriers for Ultra-scaled Interconnects Technology," Invited talk at TSMC e-Seminar, Aug. 31, 2017
47. "2D Diffusion Barriers for Ultra-scaled Interconnect Technology," Invited talk at IEEE VLSI-TSA, Hsinchu, Taiwan, April 16-19, 2018
48. "2D Diffusion Barriers for Ultra-scaled Interconnect Technology," Invited talk at ECS Meeting, Seattle, WA, May 17, 2018
49. "2D Valley-Spin Transport for Logic Applications," Invited talk at Gordon Research Conference -- 2018 Two Dimensional Electronics Beyond Graphene, Stonehill College, MA, June 3-8, 2018
50. "Stochastic Nanomagnets for Probabilistic Spin Logic," Invited talk at PQI conference, Pittsburgh, PA, Apr. 18, 2019
51. "2D Diffusion Barriers for Ultra-scaled Interconnect Technology," Invited talk at Argonne National Lab APS/CNM WK6 Workshop, Argonne, IL, May 8, 2019
52. "Observation of Valley Coupled Topological Current in 2D TMDs," Invited talk, 61st Electronic Materials Conference, Ann Arbor, MI, June 2019
53. "Enhancing Interconnect Reliability and Performance by 2D Materials," Invited talk, 2020 VLSI TSA, Hsinchu, Taiwan, Aug. 10-13, 2020

54. "2D Materials for Back-end-of-line Interconnect and Novel Logic Applications," Invited seminar, UT Austin ECE Departmental Colloquium, Oct. 28, 2020
55. "2D Materials for Back-end-of-line Interconnect and Valleytronic Applications," Invited seminar, RPI MSE Departmental Colloquium, Nov. 18, 2020
56. "2D Materials for Back-end-of-line Interconnect Applications," Keynote Lecture, GrapheneForUS 2021, Feb. 24, 2021
57. "2D Materials for Logic and Back-end-of-line Interconnect Applications," Invited Talk at Argonne Microelectronics Colloquium, Aug. 27, 2021
58. "NEW LIMITS Overview and 2D Materials for BEOL Interconnect Applications," Invited Seminar, EMD, Nov. 29, 2021
59. "2D Materials for BEOL Interconnect and Logic Applications", Invited Seminar, ASM, Jan. 26, 2022
60. "2D Materials for BEOL Interconnect and Logic Applications", Invited Talk at CSTIC, June 20, 2022
61. "2D TMDs for Ultra-scaled Transistor Applications", Invited seminar, IBM, July 22, 2022
62. "Opportunities Beyond CMOS", Invited talk, Steep Perlot Semiconductor Leadership Summit, Sep. 15, 2022
63. "2D Materials for BEOL Interconnect and Logic Applications", Plenary Talk at 2022 IEEE Nanotechnology Materials and Devices Conference (NMDC), Nov. 18, 2022
64. "2D Diffusion Barriers for Ultra-scaled Interconnect Technology," MRS Fall Meeting Tutorial Program, Invited talk, San Francisco, CA, Apr. 10, 2023
65. "2D TMDs for Ultra-scaled Transistor Applications," Invited seminar, SAIT, Apr. 20, 2023

Patents Approved and Patent Applications

1. *Transparent electrodes from single wall carbon nanotubes*, US 7,261,852, A.G. Rinzler, Z. Chen, issued on Aug 28, 2007
2. *Transparent and electrically conductive single wall carbon nanotube films*, US 7,972,699, A.G. Rinzler, Z. Chen, issued on July 5, 2011

3. *Local bottom gates for graphene and carbon nanotube devices*, US 8,124,463, Z. Chen, A.D. Franklin, J.B. Hannon, G.S. Tulevski, issued on Feb. 28, 2012
4. *Ultrathin spacer formation for carbon-based FET*, US 8,274,072, Z. Chen, D. Guo, S.-J. Han, K. Zhao, issued on June 5, 2012
5. *Vertical stacking of carbon nanotube arrays for current enhancement and control*, US 8,288,759, Z. Chen, A.D. Franklin, and S.-J. Han, issued on October 16, 2012
6. *Method to improve nucleation of materials on graphene and carbon nanotubes*, US 8,895,352, K. Babich, A. Callegari, Z. Chen, E. Kiewra, Y. Sun, issued on Nov. 25, 2014
7. *Graphene field effect transistors for radiation detection*. US 9,508,885 B1, M. Li, Z. Chen, issued on Nov. 29, 2016
8. *Quantum capacitance graphene varactors and fabrication methods*, US 9,893,212, Z. Chen, S.-J. Han, S. Koswatta, A.V. Garcia, issued on Feb. 13, 2018
9. *Plasma-enhanced chemical vapor deposition methods for graphene deposition*. US 10,151,027 B2, Z. Chen, R. Mehta, S. Chugh, issued on Dec. 11, 2018
10. *Ultra-thin diffusion barrier*. US 11,289,423, Z. Chen, C.-L. Lo, issued on June 16, 2022
11. *Graphene production using plasma-enhanced chemical vapor deposition*. US 10604844, Z. Chen, S. Zhang, Issued on Mar. 31, 2020.
12. *Valley spin Hall effect based Non-volatile Memory*. US 16909971, S. K. Thirumala, S.K. Gupta, Y.-T. Hung, Z. Chen, Issued in July 2023
13. *Electronic devices, electrodes thereof, and methods for producing the same*. US Serial No. 17/143,491; H. Lee, H. Park, Z. Chen, filed Jan. 7, 2021

Editorial Positions

1. Editor, IEEE Electron Device Letters, 2012 – 2020
2. Guest Editor, Applied Physics Letters, Special Topic: Dimensional Scaling of Material Functional Properties to meet Back-End-of-Line (BEOL) Challenges, 2021-2022

