

Wen-Sheng Zhao

Professor, School of Electronics and Information,
Hangzhou Dianzi University, Hangzhou, China
Email: wshzhao@hdu.edu.cn

EDUCATION AND WORKING EXPERIENCE

Sep. 2004 – Jul. 2008 Bachelor, Harbin Institute of Technology, Harbin, China
Sep. 2008 – Jul. 2013 Ph.D., Zhejiang University, Hangzhou, China
Aug. 2013 – Present Faculty member, Hangzhou Dianzi University, Hangzhou, China

RESEARCH

- IC Interconnect and Packaging (Multiphysics, signal/power integrity, EMC)
- Microwave Components such as sensor, filter, and FSS
- 3D Integrated Circuit and Microsystem

PROFESSIONAL ACTIVITIES

- Senior Member, IEEE & Chinese Institute of Electronics (2018-present)
- Associate Editor, IEEE Access (2019-present)
- Editor, Microelectronics Journal (2020-present)
- Guest Editor, Micromachines (2021-present)

PUBLICATION

Books & Chapters

- [1] H. Zhang, F. Che, T. Lin, and **W. Zhao**, Modeling, Analysis, Design and Tests for Electronics Packaging beyond Moore, Elsevier, ISBN: 978-0-08-102532-1, 2019.
- [2] 张恒运, 车法星, 林挺宇, **赵文生**, Modeling, Analysis, Design and Tests for Electronics Packaging beyond Moore (英文版, “十三五”国家重点图书), 化学工业出版社, ISBN: 978-7-122-37952-8, 2021.
- [3] **赵文生**, 王高峰, 尹文言, 后摩尔时代集成电路新型互连技术, 科学出版社, ISBN: 978-7-03-053418-7, 2017.
- [4] W.-Y. Yin, **W.-S. Zhao**, et al., "Electro-thermal modeling of carbon nanotube-based TSVs," Carbon Nanotube for Interconnects: Process, Design and Applications, pp. 247-281, Springer, 2017 (Chapter).
- [5] W.-Y. Yin and **W.-S. Zhao**, "Modeling and characterization of on-chip interconnects," Wiley Encyclopedia of Electrical and Electronics Engineering, Wiley, 2013 (Chapter).
- [6] **W.-S. Zhao**, et al., "Carbon-based interconnects for RF nanoelectronics," Wiley Encyclopedia of Electrical and Electronics Engineering, Wiley, 2012 (Chapter).

Journal articles

- [1] Y.-H. Fang, **W.-S. Zhao***, et al., "An AMC-based liquid sensor optimized by particle-ant colony optimization algorithms," *IEEE Sensors Journal*, 2022.
- [2] J. Xu, Y. Sun, J. Liu, Y.-D. Wei, **W.-S. Zhao**, et al., "Fabrication and high-frequency characterization of low-cost fan-in/out WLP technology with RDL for 2.5D/3D heterogeneous integration," *Microelectronics Journal*, vol. 119, p. 105332, 2022.
- [3] **W.-S. Zhao**, et al., "Swarm intelligence algorithm based optimal design of microwave microfluidic sensors," *IEEE Transactions on Industrial Electronics*, vol. 69, no. 2, pp. 2077-2087, 2022.
- [4] P.-W. Zhu, X. Wang*, **W.-S. Zhao***, et al., "Design of H-shaped planar displacement microwave sensors with wide dynamic range," *Sensors and Actuators A: Physical*, vol. 333, p. 113311, 2022.
- [5] B.-X. Wang, **W.-S. Zhao***, et al., "Optimal design of planar microwave microfluidic sensors based on deep reinforcement learning," *IEEE Sensors Journal*, vol. 21, no. 24, pp. 27441-27449, 2021.
- [6] W.-J. Wu, **W.-S. Zhao***, et al., "A temperature-compensated differential microstrip sensor for microfluidic applications," *IEEE Sensors Journal*, vol. 21, no. 21, pp. 24075-24083, 2021.
- [7] D.-W. Wang, **W.-S. Zhao***, et al., "A hybrid streamline upwind finite volume-finite element method for semiconductor continuity equations," *IEEE Transactions on Electron Devices*, vol. 68, no. 11, pp. 5421-5429, 2021.
- [8] J.-H. Zhu, D.-W. Wang*, **W.-S. Zhao***, et al., "A proposal of vertical MOSFET and its electrothermal analysis for monolithic 3-D ICs," *Electronics*, vol. 10, no. 18, p. 2241, 2021.
- [9] P. Zhang, D.-W. Wang*, **W.-S. Zhao***, et al., "Multiphysics analysis and optimal design of compressible micro-interconnect for 2.5D/3D heterogeneous integration," *Electronics*, vol. 10, no. 18, p. 2240, 2021.
- [10] W.-J. Wu, **W.-S. Zhao***, et al., "Ultrahigh-sensitivity microwave microfluidic sensors based on complementary electric-LC and split-ring structures," *IEEE Sensors Journal*, vol. 21, no. 17, pp. 18756-18763, 2021.
- [11] H.-Y. Gan, **W.-S. Zhao***, et al., "High-Q active microwave sensor based on microstrip complementary split-ring resonator (MCSRR) structure for dielectric characterization," *ACES Journal*, vol. 36, no. 7, pp. 922-927, 2021.
- [12] Y.-H. Ma, L.-H. Ruan, J. Wang*, **W.-S. Zhao***, et al., "Spatial selected spin filtering effect in Z-shaped MoS₂ nanoribbon," *IEEE Access*, vol. 9, pp. 106784-106789, 2021.
- [13] B.-X. Wang, **W.-S. Zhao***, et al., "Sensitivity optimization of differential microwave sensors for microfluidic applications," *Sensors and Actuators A: Physical*, vol. 330, p. 112866, 2021.
- [14] H. Jiang, X. Qi, Q. Wang, K. Xu, S. Chen, L. Wu, F. Zhu, **W. Zhao**, et al., "High-precision dielectric sensor system based on balanced CSRR-SIW resonators," *International Journal of RF and Microwave Computer-Aided Engineering*, vol. 31, no. 7, p. e22696, 2021.
- [15] Q.-H. Hu, **W.-S. Zhao***, et al., "Electrical modeling of carbon nanotube-based shielded through-silicon vias for three-dimensional integrated circuits," *International Journal of Numerical Modelling: Electronic Networks, Devices and Fields*, vol. 34, no. 2, p. e2842, 2021.
- [16] T. Wang, J. Zou, G. P. Puccioni, **W. Zhao**, et al., "Methodological investigation into the noise influence on nanolasers' large signal modulation," *Optics Express*, vol. 29, no. 4, pp. 5081-5097, 2021.

- [17] Q. Liu, **W.-S. Zhao**, et al., "RFID-based bidirectional wireless rollover sensor for intelligent wheelchair," *Microwave and Optical Technology Letters*, vol. 63, no. 2, pp. 504-509, 2021.
- [18] Q.-H. Hu, **W.-S. Zhao***, et al., "On the applicability of two-bit carbon nanotube through-silicon via for power distribution networks in 3-D integrated circuits," *IET Circuits, Devices & Systems*, vol. 15, no. 1, pp. 20-26, 2021.
- [19] L.-C. Fan, **W.-S. Zhao***, et al., "An ultrahigh sensitivity microwave sensor for microfluidic applications," *IEEE Microwave and Wireless Components Letters*, vol. 30, no. 12, pp. 1201-1204, 2020.
- [20] Q. Liu, **W.-S. Zhao**, et al., "Broadband T-bar fed slot antenna array with stable horizontally polarized omnidirectional radiation," *International Journal of RF and Microwave Computer-Aided Engineering*, vol. 30, no. 11, p. e22427, 2020.
- [21] **W.-S. Zhao**, et al., "Modeling of carbon nanotube-based differential through-silicon vias in 3-D ICs," *IEEE Transactions on Nanotechnology*, vol. 19, pp. 492-499, 2020.
- [22] L. Dong, Z. Xu, W. Xuan, H. Yan, C. Liu, **W.-S. Zhao**, et al., "A characterization of the performance of gas sensor based on heater in differential gas flow rate environments," *IEEE Transactions on Industrial Informatics*, vol. 16, no. 10, pp. 6281-6290, 2020.
- [23] H.-Y. Gan, **W.-S. Zhao***, et al., "Differential microwave microfluidic sensor based on microstrip complementary split-ring resonator (MCSRR) structure," *IEEE Sensors Journal*, vol. 20, no. 11, pp. 5876-5884, 2020.
- [24] P.-W. Liu, **W.-S. Zhao***, et al., "Optimal repeater insertion for nano-interconnects in current-mode signaling scheme," *IET Micro & Nano Letters*, vol. 15, no. 5, pp. 308-312, 2020.
- [25] D.-W. Wang, **W.-S. Zhao**, et al., "Fully coupled electrothermal simulation of resistive random access memory (RRAM) arrays," *Science China: Information Sciences*, vol. 63, no. 8, p. 189401, 2020.
- [26] Q.-H. Hu, **W.-S. Zhao***, et al., "Modeling and characterization of differential multi-bit carbon nanotube through-silicon vias," *IEEE Transactions on Components, Packaging and Manufacturing Technology*, vol. 10, no. 3, pp. 534-537, 2020.
- [27] **W.-S. Zhao**, et al., "Microwave planar sensors for fully characterizing magneto-dielectric materials," *IEEE Access*, vol. 8, pp. 41985-41999, 2020.
- [28] F. Jiang, **W.-S. Zhao***, et al., "Mini-review: Recent progress in the development of MoSe₂ based chemical sensors and biosensors," *Microelectronics Engineering*, vol. 225, p. 111279, 2020.
- [29] H.-Y. Gan, **W.-S. Zhao***, et al., "A CSRR-loaded planar sensor for simultaneously measuring permittivity and permeability," *IEEE Microwave and Wireless Components Letters*, vol. 30, no. 2, pp. 219-221, 2020.
- [30] W. Li, **W.-S. Zhao***, et al., "Optimal repeater insertion for horizontal and vertical graphene nanoribbon interconnects," *International Journal of Numerical Modelling: Electronic Networks, Devices and Fields*, vol. 33, no. 2, p. e2696, 2020.
- [31] Q. Liu, Y.-F. Yu, **W.-S. Zhao**, et al., "A microfluidic temperature sensor based on temperature-dependent dielectric property of liquid," *Chinese Physics B*, vol. 29, no. 1, p. 010701, 2020.
- [32] L.-C. Fan, **W.-S. Zhao***, et al., "A high-Q active substrate integrated waveguide based sensor for fully characterizing magneto-dielectric (MD) materials," *Sensors and Actuators A: Physical*, vol. 301, no. 111778, 2020.
- [33] L. Dong, Z. Qiao, H. Wang, W. Yang, **W. Zhao**, et al., "The gas leak detection based on a

- wireless monitoring system," *IEEE Transactions on Industrial Informatics*, vol. 15, no. 12, pp. 6240-6251, 2019.
- [34] D.-W. Wang, **W.-S. Zhao***, et al., "Parallel simulation of fully coupled electrothermal processes in large-scale phase-change memory (PCM) arrays," *IEEE Transactions on Electron Devices*, vol. 66, no. 12, pp. 5117-5125, 2019.
 - [35] Q. Liu, H. Li, Y.-F. Yu, **W.-S. Zhao***, et al., "A novel finger-controlled passive RFID tag design for human-machine interaction," *Sensors*, vol. 19, no. 23, p. 5125, 2019.
 - [36] Y. Hu, Z. Liu, S. Chen, J. Wang, **W.-S. Zhao**, et al., "Numerical investigation on L-shaped vertical field plate in high-voltage LDMOS," *Results in Physics*, vol. 15, p. 102547, 2019.
 - [37] Y.-Y. Zhang, **W.-S. Zhao***, et al., "Novel electromagnetic bandgap structure for wideband suppression of simultaneous switching noise," *Electronics Letters*, vol. 55, no. 23, pp. 1243-1245, 2019.
 - [38] K. Fu, J. Zheng, **W.-S. Zhao***, et al., "Analysis of transmission characteristics of copper/carbon nanotube composite through-silicon via interconnects," *Chinese Journal of Electronics*, vol. 28, no. 5, pp. 920-924, 2019.
 - [39] J.-W. Pan, K. Fu, Q. Liu, **W.-S. Zhao***, et al., "Modelling of crosstalk in differential through-silicon vias for three-dimensional integrated circuits," *IET Microwaves, Antennas & Propagation*, vol. 13, no. 10, pp. 1529-1535, 2019.
 - [40] D.-W. Wang, **W.-S. Zhao**, et al., "Terahertz frequency selective surface based on metal-graphene structure with independent frequency tuneability," *IET Microwaves, Antennas & Propagation*, vol. 13, no. 7, pp. 911-916, 2019.
 - [41] **W.-S. Zhao**, et al., "Mini-review: Modeling and performance analysis of nanocarbon interconnects," *Applied Sciences*, vol. 9, no. 11, p. 2176, 2019.
 - [42] Z.-H. Cheng, **W.-S. Zhao***, et al., "Modelling and delay analysis of on-chip differential carbon nanotube interconnects," *IET Micro & Nano Letters*, vol. 14, no. 5, pp. 505-510, 2019.
 - [43] D.-W. Wang, W. Chen, **W.-S. Zhao***, et al., "An improved algorithm for drift diffusion transport and its application on large scale parallel simulation of resistive random access memory arrays," *IEEE Access*, vol. 7, pp. 31273-31285, 2019.
 - [44] **W.-S. Zhao**, et al., "Repeater insertion to reduce delay and power in copper and carbon nanotube-based nanointerconnects," *IEEE Access*, vol. 7, pp. 13622-13633, 2019.
 - [45] D.-W. Wang, W. Chen, **W.-S. Zhao***, et al., "Fully coupled electro-thermal simulation of large RRAM arrays in the 'thermal-house'," *IEEE Access*, vol. 7, pp. 3897-3908, 2019.
 - [46] K. Fu, **W.-S. Zhao***, et al., "A compact passive equalizer design for differential channels in TSV-based 3-D ICs," *IEEE Access*, vol. 6, pp. 75278-75292, 2018.
 - [47] N. Li, J. Mao, **W.-S. Zhao**, et al., "High-frequency electrothermal characterization of TSV-based power delivery network," *IEEE Transactions on Components, Packaging and Manufacturing Technology*, vol. 8, no. 12, pp. 2171-2179, 2018.
 - [48] Z.-H. Cheng, **W.-S. Zhao***, et al., "Analysis of Cu-graphene interconnects," *IEEE Access*, vol. 6, pp. 53499-53508, 2018.
 - [49] K. Fu, **W.-S. Zhao***, et al., "A passive equalizer design for shielded differential through-silicon vias in 3-D ICs," *IEEE Microwave and Wireless Components Letters*, vol. 28, no. 9, pp. 768-770, 2018.
 - [50] K. Fu, **W.-S. Zhao***, et al., "Modeling and performance analysis of shielded differential annular through-silicon via (SD-ATSV) for 3-D ICs," *IEEE Access*, vol. 6, pp. 33238-33250,

2018.

- [51] J. Jin, **W.-S. Zhao***, et al., "Multiphysics characterization of polymer filled through-silicon vias (PF-TSVs) for three-dimensional integration," *International Journal of Numerical Modelling: Electronic Networks, Devices and Fields*, vol. 31, no. 4, p. e2348, 2018.
- [52] X. Fang, L. Dong, **W.-S. Zhao**, et al., "Vibration-caused errors in MEMS tuning fork gyroscopes with imbalance," *Sensors*, vol. 18, no. 6, pp. 1755, 2018.
- [53] **W.-S. Zhao**, et al., "Vertical graphene nanoribbon interconnects at the end of the roadmap," *IEEE Transactions on Electron Devices*, vol. 65, no. 6, pp. 2632-2637, 2018.
- [54] J. Jin, **W.-S. Zhao***, et al., "Investigation of carbon nanotube-based through-silicon vias for PDN applications," *IEEE Transactions on Electromagnetic Compatibility*, vol. 60, no. 3, pp. 638-646, 2018.
- [55] P. Zhao, Y. Zhang, R. Sun, **W.-S. Zhao**, et al., "Design of a novel miniaturized frequency selective surface based on 2.5-dimensional Jerusalem cross for 5G applications," *Wireless Communications & Mobile Computing*, vol. 2018, p. 348208, 2018.
- [56] P.-W. Liu, Z.-H. Cheng, **W.-S. Zhao***, et al., "Repeater insertion for multi-walled carbon nanotube (MWCNT) interconnects," *Applied Sciences*, vol. 8, no. 2, p. 236, 2018.
- [57] H. Wang, L. Dong, W. Wei, **W.-S. Zhao**, et al., "The WSN monitoring system for large outdoor advertising boards based on ZigBee and MEMS sensor," *IEEE Sensors Journal*, vol. 18, no. 3, pp. 1314-1323, 2018.
- [58] D.-W. Wang, **W.-S. Zhao***, et al., "Tunable THz multiband frequency-selective surface based on hybrid metal-graphene structures," *IEEE Transactions on Nanotechnology*, vol. 16, no. 6, pp. 1132-1137, 2017.
- [59] Z.-H. Cheng, **W.-S. Zhao***, et al., "Investigation of copper-carbon nanotube composites as global VLSI interconnects," *IEEE Transactions on Nanotechnology*, vol. 16, no. 6, pp. 891-900, 2017.
- [60] Q.-L. Gu, P. Zhang, Y. Ru, H. Song, **W.-S. Zhao**, et al., "A comparative study on electrothermal characteristics of nanoscale multiple gate MOSFETs," *Microelectronics Reliability*, vol. 78, pp. 362-369, 2017.
- [61] K. Xu, F. Liu, L. Peng, **W.-S. Zhao**, et al., "Multi-mode and wideband printed loop antenna based on degraded split-ring resonators," *IEEE Access*, vol. 5, pp. 15561-15570, 2017.
- [62] Y. Hu, Y. Gong, H. Liu, Q. Xu, **W.-S. Zhao**, et al., "Numerical investigation of high-voltage partial buried P/N layer SOI LDMOS," *IEEE Transactions on Electron Devices*, vol. 64, no. 9, pp. 3725-3733, 2017.
- [63] **W.-S. Zhao**, et al., "Modeling and characterization of coaxial through-silicon via with electrically floating inner silicon," *IEEE Transactions on Components, Packaging and Manufacturing Technology*, vol. 7, no. 6, pp. 936-943, 2017.
- [64] J. Wang, H. Lu, Y. Hu, **W.-S. Zhao**, et al., "Quantum pumping of layer pseudospin current in biased bilayer graphene," *Journal of Physics D: Applied Physics*, vol. 50, no. 20, p. 205101, 2017.
- [65] A. G. D'Aloia, **W.-S. Zhao**, et al., "Near field radiated from carbon nanotube and graphene based nano-interconnects," *IEEE Transactions on Electromagnetic Compatibility*, vol. 59, no. 2, pp. 646-653, 2017.
- [66] **W.-S. Zhao**, et al., "Transient analysis of through-silicon vias in floating silicon substrate," *IEEE Transactions on Electromagnetic Compatibility*, vol. 59, no. 1, pp. 207-216, 2017.

- [67] F. Wen, X. Liu, Z. Xu, H. Tang, W. Bai, **W.-S. Zhao**, et al., "Low loss and high permittivity composites based on poly(vinylidene fluoride-chlorotrifluoroethylene) and lead lanthanum zirconate titanate," *Ceramics International*, vol. 43, no. 1, pp. 1504-1508, 2017.
- [68] A. Chen, F. Liang, B.-Z. Wang, **W.-S. Zhao**, et al., "Conduction mode analysis and impedance parameter extraction of shielded pair transmission structure," *IEEE Microwave and Wireless Components Letters*, vol. 26, no. 9, pp. 654-656, 2016.
- [69] L. Dong, J. Tao, J. Bao, **W.-S. Zhao**, et al., "Anchor loss variation in MEMS wine-glass mode disk resonators due to fluctuating fabrication process," *IEEE Sensors Journal*, vol. 16, no. 18, pp. 6846-6856, 2016.
- [70] **W.-S. Zhao**, et al., "High frequency modeling of on-chip coupled carbon nanotube interconnects for millimeter-wave applications," *IEEE Transactions on Components, Packaging and Manufacturing Technology*, vol. 6, no. 8, pp. 1226-1232, 2016.
- [71] J. Wang, M. Long, **W.-S. Zhao**, et al., "A valley and spin filter based on gapped graphene," *Journal of Physics: Condensed Matter*, vol. 28, no. 28, p. 285302, 2016.
- [72] **W.-S. Zhao**, et al., "High frequency analysis of Cu-carbon nanotube composite through-silicon vias," *IEEE Transactions on Nanotechnology*, vol. 15, no. 3, pp. 506-511, 2016.
- [73] N. Li, J. Mao*, **W.-S. Zhao***, et al., "Electrothermal cosimulation of 3-D carbon-based heterogeneous interconnects," *IEEE Transactions on Components, Packaging and Manufacturing Technology*, vol. 6, no. 4, pp. 518-526, 2016.
- [74] W. Chen, W.-Y. Yin, **W.-S. Zhao**, et al., "Scaling analysis of high gain monolayer MoS₂ photodetector for its performance optimization," *IEEE Transactions on Electron Devices*, vol. 63, no. 4, pp. 1608-1614, 2016.
- [75] **W.-S. Zhao**, et al., "Wideband modeling and characterization of differential through-silicon vias for 3-D ICs," *IEEE Transactions on Electron Devices*, vol. 63, no. 3, pp. 1168-1175, 2016.
- [76] **W.-S. Zhao**, et al., "High-frequency modeling of Cu-graphene heterogeneous interconnects," *International Journal of Numerical Modelling: Electronic Networks, Devices and Fields*, vol. 29, no. 2, pp. 157-165, 2016.
- [77] **W.-S. Zhao**, et al., "Performance and stability analysis of monolayer single-walled carbon nanotube interconnects," *International Journal of Numerical Modelling: Electronic Networks, Devices and Fields*, vol. 28, no. 4, pp. 456-464, 2015.
- [78] D.-W. Wang, **W.-S. Zhao***, et al., "Wideband modeling of graphene-based structures at different temperatures using hybrid FDTD method," *IEEE Transactions on Nanotechnology*, vol. 14, no. 2, pp. 250-258, 2015.
- [79] R. Zhang, **W.-S. Zhao**, et al., "Electrothermal characterization of multilevel Cu-graphene heterogeneous interconnects in the presence of an electrostatic discharge (ESD)," *IEEE Transactions on Nanotechnology*, vol. 14, no. 2, pp. 205-209, 2015.
- [80] R. Zhang, **W.-S. Zhao***, et al., "Impacts of diamond heat spreader on the thermo-mechanical characteristics of high-power AlGaIn/GaN HEMTs," *Diamond and Related Materials*, vol. 52, pp. 25-31, 2015.
- [81] X.-C. Wang, **W.-S. Zhao***, et al., "Reconfigurable terahertz leaky-wave antenna using graphene-based high-impedance surface," *IEEE Transactions on Nanotechnology*, vol. 14, no. 1, pp. 62-69, 2015.
- [82] **W.-S. Zhao**, et al., "Electrical modeling of on-chip Cu-graphene heterogeneous interconnects," *IEEE Electron Device Letters*, vol. 36, no. 1, pp. 74-76, 2015.

- [83] **W.-S. Zhao**, et al., "Comparative study on multilayer graphene nanoribbon (MLGNR) interconnects," *IEEE Transactions on Electromagnetic Compatibility*, vol. 56, no. 3, pp. 638–645, 2014.
- [84] **W.-S. Zhao**, et al., "Repeater insertion for carbon nanotube interconnects," *IET Micro & Nano Letters*, vol. 9, no. 5, pp. 337–339, 2014.
- [85] Y.-F. Liu, **W.-S. Zhao***, et al., "Electrical modeling of three-dimensional carbon-based heterogeneous interconnects," *IEEE Transactions on Nanotechnology*, vol. 13, no. 3, pp. 488–495, 2014.
- [86] R. Zhang, **W.-S. Zhao**, et al., "Investigation on thermo-mechanical responses in high power multi-finger AlGaIn/GaN HEMTs," *Microelectronics Reliability*, vol. 54, no. 3, pp. 757–781, 2014.
- [87] **W.-S. Zhao**, et al., "Electrothermal modelling and characterisation of submicron through silicon carbon nanotube bundle vias for three-dimensional ICs," *IET Micro & Nano Letters*, vol. 9, no. 2, pp. 123–126, 2014.
- [88] **W.-S. Zhao**, et al., "Electromagnetic compatibility-oriented study on through silicon single-walled carbon nanotube bundle via (TS-SWCNTBV) arrays," *IEEE Transactions on Electromagnetic Compatibility*, vol. 54, no. 1, pp. 149–157, 2012.
- [89] J.-P. Cui, **W.-S. Zhao**, et al., "Signal transmission analysis of multilayer graphene nano-ribbon (MLGNR) interconnects," *IEEE Transactions on Electromagnetic Compatibility*, vol. 54, no. 1, pp. 126–132, 2012.
- [90] **W.-S. Zhao**, et al., "Frequency- and temperature-dependent modeling of coaxial through-silicon vias for 3-D ICs," *IEEE Transactions on Electron Devices*, vol. 58, no. 10, pp. 3358–3368, 2011.
- [91] **W.-S. Zhao**, et al., "Electrothermal effects in high density through-silicon via (TSV) array," *Progress In Electromagnetics Research*, vol. 115, pp. 223–242, 2011.