

宋荣国

个人信息

出身年月: 1993年2月
政治面貌: 中共党员
籍贯: 山东潍坊
电子邮件: rongguo_song@whut.edu.cn



教育背景

2018.09-2021.11	武汉理工大学	信息与通信工程	博士
2015.09-2018.06	武汉理工大学	物理学	硕士
2011.09-2015.06	武汉理工大学	电子信息科学与技术	学士

工作经历

2022.08 至今	中国人民解放军空军预警学院	博士后（合作导师：王永良 院士）
2015.07-2017.09	武汉理工大学理学院	学生辅导员

研究方向

- 高导电、高导热宏观石墨烯薄膜材料研究
- 微波、毫米波天线阵列及可穿戴器件研究

学术兼职

- 《Crystals》期刊客座编辑

主持/参与项目

1. 研究生自主创新研究基金优秀博士学位论文培育项目：石墨烯微波毫米波天线研究（WUT: 2020-YB-032） 主持
2. 自主创新研究基金研究生自由探索项目：柔性石墨烯毫米波频率选择表面研究（WUT: 205209016） 主持
3. 自主创新研究基金研究生自由探索项目：石墨烯共形天线研究（WUT: 195209005） 主持
4. 科技部重大专项：****，2019-2022，参与
5. 装备预研领域基金：****，2019-2021，参与（主要完成人）
6. 军委科技委专项子课题：****/****，2018-2019/2019-2021，参与（主要完成人）
7. 重点实验室基金：高导电率石墨烯薄膜电磁屏蔽特性研究，2018-2019，参与（主要完成人）
8. 华为技术有限公司：石墨烯低副瓣天线项目，2021-2022，参与（主要完成人）

1. **Song R**, Mao B*, Wang Z, Hui Y, Zhang N, Fang R, Zhang J, Wu Y, Ge Q, Kostya S. Novoselov*, He D*: Comparison of Copper and Graphene Assembled Films in 5G Wireless Communication and THz Electromagnetic-Interference Shielding. *Proceedings of the National Academy of Sciences* 120(9): e2209807120, 2023. (中科院Top, T1, IF 11.1)
2. **Song R**, Jiang S, Hu Z, Fan C, Li P, Ge Q, Mao B* and He D*: Ultra-high Conductive Graphene Assembled Film for Millimeter Wave Electromagnetic Protection. *Science Bulletin* 67(11): 1122-1125, 2022. (中科院Top, T1, IF 18.9)
3. **Song R**, Wang Z, Zu H, Chen Q, Mao B, Wu Z and He D*: Wideband and low sidelobe graphene antenna array for 5G applications. *Science Bulletin* 66: 103-106, 2021. (中科院Top, T1, IF 18.9)
4. **Song R**, Wang Q, Mao B, Wang Z, Tang D, Zhang B, Zhang J, Liu C, He D*, Wu Z* and Mu S: Flexible graphite films with high conductivity for radio-frequency antennas. *Carbon* 130: 164-169, 2018. (中科院Top, T1, IF 10.9)
5. **Song R**, Si Y, Qian W, Zu H, Zhou B, Du Q, He D*, Wang Y*. Investigation of MXene Nanosheets based Radio-Frequency Electronics by Skin Depth Effect. *Nano Research*, 2023 doi.org/10.1007/s12274-023-6127-7, Accept. (中科院Top, T1, IF 9.9)
6. Zhang J, Wang Y, **Song R***, Kou Z, and He D*. Highly Flexible Graphene - Film - Based Rectenna for Wireless Energy Harvesting. *Energy & Environmental Materials*, 0 e12548, 2022. (通讯作者) (中科院Top, T1, IF 15)
7. Jiang S, **Song R***, Hu Z, Xin Y, Huang G, He D*. Millimeter wave phased array antennabased on highly conductive graphene-assembled film for 5G applications. *Carbon* 196: 493-498, 2022. (通讯作者) (中科院Top, T1, IF 10.9)
8. Zeng W, Xia F, Tian W, Cao F, Chen J, Wu J, **Song R*** and Mu S*: Single-crystal high-nickel layered cathode for lithium-ion batteries. *Current Opinion in Electrochemistry* 31: 100831, 2022. (通讯作者) (T1, IF 8.5)
9. Fan C[#], Wu B, **Song R[#]**, Zhao Y, Zhang Y and He D: Electromagnetic shielding and multi-beam radiation with high conductivity multilayer graphene film. *Carbon* 155: 506-513, 2019. (共同第一作者) (中科院Top, T1, IF 10.9)
10. **Song R**, Chen X, Jiang S, Hu Z, Liu T, Calatayud D, Mao B and He D: A Graphene-Assembled Film Based MIMO Antenna Array with High Isolation for 5G Wireless Communication. *Applied Sciences-Basel* 11: 2382, 2021. (T2, IF 2.7)
11. **Song R**, Zhao X, Wang Z, Fu H, Han K, Qian W, Wang S, Shen J, Mao B and He D:

- Sandwiched Graphene Clad Laminate: A Binder - Free Flexible Printed Circuit Board for 5G Antenna Application. *Advanced Engineering Materials* 22: 2000451, 2020. (T2, IF 3.6)
12. Jin S, Zu H, Qian W, Luo K, Xiao Y, Song R*, Xiong B*: A Quad-Band and Polarization-Insensitive Metamaterial Absorber with a Low Profile Based on Graphene-Assembled Film. *Materials* 16, 4178, 2023. (通讯作者) (T2, IF 3.4)
 13. Guo J, Si Y, Song R*, Zu H, Xin Y, Ye D, Xu M, Li B*, He D*: High-Conductivity MXene Film-Based Millimeter Wave Antenna for 5G Applications. *Crystals* 13, 1136, 2023. (通讯作者) (T2, IF 2.7)
 14. Hui Y, Zu H, Song R*, Fu H, Luo K, Tian C, Wu, B.; Huang, G.; Kou, Z.; Cheng, X. *; He, D*. Graphene-Assembled Film-Based Reconfigurable Filtering Antenna with Enhanced Corrosion-Resistance. *Crystals* 13, 747, 2023. (通讯作者) (T2, IF 2.7)
 15. Hu Z, Xiao Z, Jiang S, Song R* and He D*: A Dual-band conformal antenna based on highly conductive graphene-assembled films for 5G WLAN applications. *Materials* 14(17), 5087, 2021. (通讯作者) (T2, IF 3.4)
 16. Liu X#, Song R#, Fu H, Zhu W, Luo K, Xiao Y, Zhang B*, Wang S, He D*. Anti-High-Power Microwave RFID Tag Based on Highly Thermal Conductive Graphene Films. *Materials* 16, 3370, 2023. (共同第一作者) (T2, IF 3.4)
 17. Zhang J#, Song R#, Zhao X, Fang R, Zhang B, Qian W, Zhang J, Liu C and He D: Flexible Graphene-Assembled Film-Based Antenna for Wireless Wearable Sensor with Miniaturized Size and High Sensitivity. *ACS Omega* 5: 12937-12943, 2020. (共同第一作者) (T2, IF 4.1)
 18. Guan H#, Song R# Tong C, Zhao X, Yang Y*, and He D*. Graphene assembled film based conformal sensor array for submillimeter crack location and direction detection *Applied Physics Express* 16: 015512, 2023. (共同第一作者) (T2, IF 2.3)
 19. Song R, Huang G, Liu C, Zhang N, Zhang J, Liu C, Wu ZP and He D: High-conductive graphene film based antenna array for 5G mobile communications. *International Journal of RF and Microwave Computer-Aided Engineering* 29: e21692, 2019. (T3, IF 1.7)
 20. Wang C, Song R*, Jiang S, Hu Z and He D*: Low profile and miniaturized dual-band antenna based on graphene assembled film for wearable applications. *International Journal of RF and Microwave Computer-Aided Engineering* 32: 23050, 2022. (通讯作者) (T3, IF 1.7)
 21. Luo K, Zu H, Song R*, Xin Y, Guo J, Ye D, Xu M, Huang G, He D*. An Anisotropic Broadband Coding Metasurface Based on Ultralight Graphene-Assembled Film. *Microwave and Optical Technology Letters* 2023 (Accept). (通讯作者) (T3, IF 1.5)

22. Tong C[#], **Song R[#]**, Guan H, Yang Y* and He D*: Conformal metal crack detection sensor based on flexible graphene film antenna. *International Journal of RF and Microwave Computer-Aided Engineering* e23172, 2022. (共同第一作者) (T3, IF 1.7)
23. Yang W, Xu L, Luo W, Huang M, Fu K, **Song R**, Han C, Tu R, Shi J, Mai L*. Rechargeable zinc-ammonium hybrid microbattery with ultrahigh energy and power density. *Matter* 6: 1-15, 2023. (中科院Top, T1, IF 18.9)
24. Zhang B, Wang Z, **Song R**, Fu H, Zhao X, Zhang C, He D and Wu ZP: Passive UHF RFID tags made with graphene assembly film-based antennas. *Carbon* 178: 803-809, 2021. (中科院Top, T1, IF 10.9)
25. Chen Q, Su X, Liu X, Wang J, **Song R**, He D, Chaemchuen S, Verpoort F: Bimetallic-doped Zeolitic imidazole framework-derived Cobalt-Nitrogen-Carbon supported on reduced graphene oxide enabling efficient microwave absorption. *Journal of the Taiwan Institute of Chemical Engineers* 134: 104350, 2022. (T1, IF 5.7)
26. Qian W, Xia W, Zhou W, **Song R**, Zhao X and He D: A Graphene-Based Stopband FSS with Suppressed Mutual Coupling in Dielectric Resonator Antennas. *Materials* 14: 1490, 2021. (T2, IF 3.4)
27. Zhang C, Long C, Yin S, **Song R**, Zhang BH, Zhang JW, He DP and Cheng Q: Graphene-based anisotropic polarization meta-filter. *Materials & Design* 206: 109768, 2021. (中科院Top, T1, IF 8.4)
28. Zhang C, Zhao J, Zhang BH, **Song RG**, Wang YC, He DP and Cheng Q: Multilayered Graphene-Assisted Broadband Scattering Suppression through an Ultrathin and Ultralight Metasurface. *ACS Applied Materials & Interfaces* 13: 7698-7704, 2021. (中科院Top, T1, IF 9.5)
29. Li S, **Song R**, Zhang B, Huang B, Zhao X and He D: Wearable near - field communication bracelet based on highly conductive graphene - assembled films. *International Journal of RF and Microwave Computer-Aided Engineering* 31:2021. (T3, IF 1.7)
30. Bangqi H, Li S, **Song R**, Hou Z, Liu C and He D: High - conductivity graphene - assembled film - based bandpass filter for5G applications. *International Journal of RF and Microwave Computer-Aided Engineering* 31:2021. (T3, IF 1.7)
31. Fu H, Xiao Y, **Song R**, Wang Z, Ji H and He D: Rapid soldering of flexible graphene assembled films at low temperature in air with ultrasonic assistance. *Carbon* 158: 55-62, 2020. (中科院Top, T1, IF 10.9)
32. Fang R, **Song R**, Zhao X, Wang Z, Qian W and He D: Compact and Low-Profile UWB Antenna Based on Graphene-Assembled Films for Wearable Applications. *Sensors* 20:

2552, 2020. (T2, IF 3.9)

33. Hou Z, Liu C, Zhang B, **Song R**, Wu Z, Zhang J and He D: Dual-/Tri-Wideband Bandpass Filter with High Selectivity and Adjustable Passband for 5G Mid-Band Mobile Communications. *Electronics* 9: 205, 2020. (T3, IF 2.9)
34. Li P, Wang Z, **Song R**, Qian W, Wen P, Yang Z and He D: Customizable fabrication for auxetic graphene assembled macrofilms with high conductivity and flexibility. *Carbon* 162: 545-551, 2020. (中科院Top, T1, IF 10.9)
35. Wang Z, Li P, **Song R**, Qian W, Zhou H, Wang Q, Wang Y, Zeng X, Ren L, Yan S, Mu S and He D: High conductive graphene assembled films with porous micro-structure for freestanding and ultra-low power strain sensors. *Science Bulletin* 65: 1363-1370, 2020. (中科院Top, T1, IF 18.9)
36. Wu Q, Yang J, Zhao Y, **Song R**, Wang Z, Huang Z, Shi M, Ye Y, He D and Mu S: Lifting the energy density of lithium ion batteries using graphite film current collectors. *Journal of Power Sources* 455: 227991, 2020. (中科院Top, T1, IF 9.2)
37. Zu H, Wu B, Zhang Y, Zhao Y, **Song R** and He D: Circularly Polarized Wearable Antenna With Low Profile and Low Specific Absorption Rate Using Highly Conductive Graphene Film. *IEEE Antennas and Wireless Propagation Letters* 19: 2354-2358, 2020. (中科院Top, T2, IF 4.2)
38. Zhang N, Wang Z, **Song R**, Wang Q, Chen H, Zhang B, Lv H, Wu Z and He D: Flexible and transparent graphene/silver-nanowires composite film for high electromagnetic interference shielding effectiveness. *Science Bulletin* 64: 540-546, 2019. (中科院Top, T1, IF 18.9)
39. Zhou W, Liu C, **Song R**, Zeng X, Li B, Xia W, Zhang J, Huang G, Wu ZP and He D: Flexible radiofrequency filters based on highly conductive graphene assembly films. *Applied Physics Letters* 114: 113503, 2019. (中科院Top, T2, IF 4)
40. Wang Z, Mao B, Wang Q, Yu J, Dai J, **Song R**, Pu Z, He D, Wu Z and Mu S: Ultrahigh Conductive Copper/Large Flake Size Graphene Heterostructure Thin-Film with Remarkable Electromagnetic Interference Shielding Effectiveness. *Small* 14: 1704332, 2018. (中科院Top, T1, IF 13.3)
41. Zhang J, Wu B, Zhao Y, Song L, Zu, H, **Song R** and He D: Two-Dimensional Highly Sensitive Wireless Displacement Sensor With Bilayer Graphene-Based Frequency Selective Surface. *IEEE Sensors Journal* 21: 21, 2021. (中科院Top, T1, IF 4.3)

会议论文

1. **Song R**, Hu Z, Jiang S, Ma L, Ai Q and He D: Graphene Film Based Wireless and Flexibly Wearable Sensor for Human Joint Angle Measurement. IEEE International Conference on Real-time Computing and Robotics, 2021, pp 1-6, EI: 20213910935894.
2. **Song R**, Chen X, Jiang S, Hu Z and He D: Graphene Assembled Film Based Millimeter Wave Antenna Array for 5G Mobile Communications. IEEE MTT-S International Wireless Symposium, 2021, pp 1-3, EI: 20220711642162.
3. **Song R**, Wang C, Chen Q and He D: High Conductivity Graphene Based Films for Antenna Application. International Conference on Microwave and Millimeter Wave Technology, 2020, pp 1-3, EI: 20211610226502.
4. **Song R**, Liu C, Fang R, He D and Wu Z: Graphene Film Based Dual-band Antenna for 5G Mobile Communications. International Conference on Microwave and Millimeter Wave Technology, 2019, pp 1-3, EI: 20201008254687.
5. **Song R**, Liu C, Zhang N, Zhang J, Liu C, He D and Wu Z: Graphene Antenna for Mobile Phone Application. IEEE International Conference on Computational Electromagnetics, 2018, pp 1-2, EI: 20184806159071.
6. **Song R**, Liu C, Zhang J, Liu C, He D and Wu Z: Flexible graphene based films for microstrip array antennas. IEEE 6th Asia-Pacific Conference on Antennas and Propagation, 2017, pp 1-3, EI: 20183205677044.

发明专利

1. 何大平, 吴志鹏, **宋荣国**。一种射频微波器件及微量氮掺杂石墨烯薄膜, CN 107274958 B, 授权。
2. 何大平, 吴志鹏, **宋荣国**。一种超高电导率大尺寸石墨烯薄膜及射频微波器件, CN 107705871 B, 授权。
3. 何大平, 沈杰, **宋荣国**。一种石墨烯 PCB 及其制备方法, 专利申请号: 202010342260.2。
4. 何大平, **宋荣国**。一种柔性宏观石墨烯频率选择表面, 专利申请号: 202011014126.6。
5. 何大平, **宋荣国**。隔离度高的 MIMO 天线阵列, 专利申请号: 202011201484.8。
6. **宋荣国**, 陈鹏飞, 罗考林, 方仁强, 唐佳杰。基于石墨烯的超轻各向异性宽带编码超表面, 专利申请号: 202211422577.2。
7. 何大平, **宋荣国**, 陈鹏飞, 金诗怡, 方仁强, 唐佳杰。一种石墨烯基人工漫散射控制超表面, 专利申请号: 202211354119.X。

所获奖励及荣誉

2021年	第七届中国国际“互联网+”大学生创新创业大赛	国家级金奖
2022年	第一届中国研究生“双碳”创新创业大赛	国家级二等奖
2022年	优秀博士学位论文	武汉理工大学
2021年	校三好研究生	武汉理工大学
2019年	校三好研究生	武汉理工大学
2019年	优秀硕士学位论文	武汉理工大学
2017年	优秀研会干部	武汉理工大学
2016年	校三好研究生	武汉理工大学
2014年	优秀共产党员	武汉理工大学
2013年	湖北省社会实践活动先进个人	中共湖北省委宣传部
2012年	校三好学生	武汉理工大学