

# KAI WU, Ph.D.

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## RESEARCH INTERESTS

*Disease Diagnosis:* Magnetic Biosensors | Optical Biosensors | Magnetic Imaging

*Disease Therapy:* Magnetic Hyperthermia | Drug Delivery | Wound Healing

*Healthcare:* Point-of-Care (POC) Devices | Machine Learning Assisted Healthcare

*Magnetic Nanomaterials*

*Spintronic Devices*

*Micromagnetic Simulation*

## EDUCATION

<b>Ph.D.</b> Electrical Engineering	University of Minnesota, U.S.	2013-2017
<b>B.S.</b> Electrical Engineering	Northwestern Polytechnical University, China	2009-2013

## ACADEMIC EXPERIENCE

Assistant Professor	Texas Tech University, U.S.	2022-Present
Researcher	University of Minnesota, U.S.	2020-2022
Postdoctoral Fellow	University of Minnesota, U.S.	2017-2020

## FUNDED PROJECTS

(Total Amount: \$1.7 million)

1. NIFA-USDA (2020-67021-31956), \$414,999, 8/1/2020-7/31/2023. "Portable Magnetic Particle Spectroscopy (MPS) Platform for On-field Detection of Influenza A Virus and Mycoplasma hyopneumoniae". Role: Co-PI.
2. Midwest Dairy Association, \$80,000, 1/1/2022-12/31/2022. "Cost effective, Portable and Field-deployable GMR Platform for the Multiplexed Detection of Foodborne Listeria monocytogenes in Dairy Foods and Processing Environments". Role: Senior Researcher.
3. Minnesota Partnership for Biotechnology and Medical Genomics (MNP#19.13), \$913,049, 2/1/2020-9/30/2022, "Magnetic Nanodevice Arrays for the Treatment of Neurological Diseases". Role: Senior Researcher.
4. NIH (R42DE030832-01), \$254,027, 12/21/2020-6/14/2022. "A SARS-CoV-2 Breathalyzer for Direct Virus Detection". Role: Co-I.
5. UMN-Medical School, \$10,000, 3/1/2020-3/1/2021. "Developing portable magnetic bio-assay platforms for the detection of SARS-CoV-2". Role: Researcher.
6. UMN-IEM, \$35,000, 5/14/2018-5/14/2019. "Portable Magnetic Particle Spectroscopy (MPS) Platform for On-field Detection of Influenza A Virus and Mycoplasma hyopneumoniae". Role: Researcher.

## SELECTED HONORS & AWARDS

1. Outstanding Faculty Mentor, TTU Center for Transformative Undergraduate Experiences 2023
2. Best Poster Award, The 15th Joint MMM-INTERMAG Conference (2022 Joint) 2022  
(7 winners globally)
3. Magnetism as Art Showcase Finalist, Intermag 2021 Virtual Conference 2021
4. IOP Publishing 'Outstanding Reviewer' Award Winner 2020
5. Best Poster Award, 62<sup>nd</sup> Annual Conference on Magnetism and Magnetic Materials 2017

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6. Interdisciplinary Doctoral Fellowship 2016
  7. Bronze Poster Award, IEEE Magnetics Summer School 2016  
(3 winners from North America Region)
  8. IEEE Magnetics Summer School Travel Award, IEEE Magnetics Society 2016  
(20 awardees from North America Region)
  9. Distinguished Award, Nokia Sensing XCHALLENGE Competition, Nokia & XPRIZE Foundation 2014  
(5 award winner teams globally)
    - Startup company [Zepto Life Technology](#) (St. Paul, MN) is based on this platform.
    - Selected news releases: [WCCO](#), [Bring Me The News](#), [HIT Consultant Media](#), [MedCityNews](#), [21st Century Tech Blog](#).
  10. Outstanding Graduate, Northwestern Polytechnical University 2013
  11. Outstanding Dissertation Award, Northwestern Polytechnical University 2013
  12. National Scholarship, Ministry of Education, China 2010, 2012
  13. First Prize Scholarship, Northwestern Polytechnical University 2010, 2011, 2012
  14. Yajun Wu Fellowship, Northwestern Polytechnical University 2011

## PROFESSIONAL SERVICE

1. **Grant Proposal Reviewer**  
DOE, FOA: DE-FOA-0002844 2023
2. **Associate Editor**  
[IEEE Sensors Journal](#) 2023-Present
3. **Editorial Board Member**  
[Sensors](#) 2022-Present  
[ACS Applied Nano Materials](#) 2023-Present
4. **Guest Editor of Special Issues**  
[Magnetic and Optical Sensors for Healthcare, Medical, and Bioscience Applications](#), *Sensors* 2023  
[Magnetic Particle-Assisted Sensing and Magnetic Biosensors](#), *Frontiers in Bioengineering and Biotechnology* 2023  
[Advanced Nanomaterial-Based Sensors for Biomedical Applications](#), *Sensors* 2021-2022  
[High Sensitivity Electromagnetic Sensors and Their Applications](#), *Journal of Sensors* 2019  
[Magnetic Nanoparticles in Nanomedicine](#), *Magnetochemistry* 2018
5. **Conference Committee**  
Committee, The 1st Conference of Magnetic Technologies and Clinical Applications in Neuroscience (MagCAN). August 24 - August 25, 2023, Minneapolis, MN. 2023
6. **Conference Poster Section Reviewer**  
Texas Tech University Undergraduate Research Conference (URC) 2023
7. **Conference Proceedings Reviewer**  
*IEEE Sensors* 2020  
INTERMAG Conference 2018, 2020, 2023  
The Annual Conference on Magnetism and Magnetic Materials (MMM) 2016, 2020, 2023
8. **Journal Reviewer (in alphabetical order, full review record on [Publons](#))**  
**American Chemical Society (ACS):**  
*ACS Applied Materials & Interfaces*  
*ACS Applied Nano Materials*  
*Analytical Chemistry*  
*Nano Letters*

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**American Institute of Physics (AIP):**

AIP Advances

Applied Physics Letters

Journal of Applied Physics

Review of Scientific Instruments

**Bentham Science Publishers:**

Current Nanoscience

**Elsevier:**

Biomedicine & Pharmacotherapy

Chemical Physics Impact

Computer Methods and Programs in Biomedicine

Journal of Magnetism and Magnetic Materials

Materials Today

Materials Today Communications

Materials & Design

Process Biochemistry

**Frontiers Media S.A.:**

Frontiers in Chemistry

Frontiers in Medicine

**Hindawi:**

Case Reports in Urology

**Institute of Electrical and Electronics Engineers (IEEE):**

IEEE Access

IEEE Electron Device Letters

IEEE Magnetics Letters

IEEE Sensors Journal

IEEE Sensors Letters

IEEE Transactions on Magnetics

IEEE Transactions on NanoBioscience

IEEE Transactions on Nanotechnology

**IOP Publishing:**

Biomedical Physics & Engineering Express

Journal of Physics: Condensed Matter

Journal of Physics D: Applied Physics

Nanotechnology

Physics in Medicine and Biology

**MDPI:**

Applied Sciences

Crystals

International Journal of Molecular Sciences

Journal of Composites Science

Materials

Micromachines

Sensors

**Nature Portfolio:**

Scientific Reports

**Royal Society of Chemistry (RSC):**

Analytical Methods  
 Biomaterials Science  
 Nanoscale  
 Nanoscale Advances  
 New Journal of Chemistry  
 Physical Chemistry Chemical Physics  
 Soft Matter

**Wiley:**

Advanced Electronic Materials  
 Advanced Functional Materials  
 Advanced Healthcare Materials  
 Advanced Intelligent Systems  
 Advanced Materials  
 Advanced Materials Interfaces  
 Advanced Materials Technologies  
 Advanced Optical Materials  
 Advanced Science  
 Advanced Therapeutics  
 Chemistry Select  
 Nano Select  
 Small

## PUBLIC SERVICES

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|---|--------------|
| 1. General Chair, <a href="#">BioMed Journal Club</a> , Texas Tech University | 2023-Present |
| 2. Math & Physics curriculum sub-committee, ECE, Texas Tech University        | 2023-Present |
| 3. Graduate Studies Committee, ECE, Texas Tech University                     | 2022-Present |
| 4. Materials Characterization Center (MCC) Committee, Texas Tech University   | 2022-Present |

## JOURNAL PUBLICATIONS ([Google Scholar Link](#))

### 2023

1. Yari, P., Liang, S., Chugh, V.K., Rezaei, B., Mostufa, S., Krishna, V.D., Saha, R., Cheeran, M.C., Wang, J.P., Gómez-Pastora, J., & **Wu, K.** (2023) Nanomaterial-Based Biosensors for SARS-CoV-2 and Future Epidemics. *Analytical Chemistry*, 2023, 95, 42, 15419–15449.
2. Sun, J., Shi, Z., Liu, X., Ma, Y., Li, R., Chen, S., Xin, S., Wang, N., Jia, S., & **Wu, K.** (2023) Theoretical Investigation on the Metamaterials Based on the Magnetic Template-Assisted Self-Assembly of Magnetic–Plasmonic Nanoparticles for Adjustable Photonic Responses. *Journal of Physical Chemistry B*, 2023, 127, 40, 8681–8689.
3. Rezaei, B., Yari, P., Sanders, S.M., Wang, H., Chugh, V.K., Liang, S., Mostufa, S., Xu, K., Wang, J.P., Gómez-Pastora, J., & **Wu, K.** (2023) Magnetic Nanoparticles: A Review on Synthesis, Characterization, Functionalization, and Biomedical Applications. *Small*, 2023, 2304848.
4. Mostufa, S., Rezaei, B., Yari, P., Xu, K., Gómez-Pastora, J., Sun, J., Shi, Z., & **Wu, K.** (2023). Giant Magnetoresistance Based Biosensors for Cancer Screening and Detection. *ACS Applied Bio Materials*, 2023, 6, 10, 4042–4059.
5. Chugh, V., Liang, S., Tonini, D., Saha, R., Liu, J., Yari, P., Krishna, V.D., Cheeran, M.C., **Wu, K.**, & Wang, J.P. (2023). Static and Dynamic Magnetization Responses of Self-Assembled Magnetic Nanoparticle Chains. *Journal of Physical Chemistry C*, 2023, 127, 37, 18494–18505.

6. Mostufa, S., Yari, P., Rezaei, B., Xu, K., Sun, J., Shi, Z., & **Wu, K.** (2023). Metamaterial As Perfect Absorber for High Sensitivity Refractive Index Based Biosensing Applications at Infrared Frequencies. *Journal of Physics D: Applied Physics*, 56, 445104.
  7. Mostufa, S., Yari, P., Rezaei, B., Xu, K., & **Wu, K.** (2023). Flexible Magnetic Field Nanosensors for Wearable Electronics: A Review. *ACS Applied Nano Materials*, 2023, 6, 15, 13732–13765.
  8. Yari, P., Chugh, V., Saha, R., Tonini D., Rezaei, B., Mostufa, S., Xu, K., Wang, J.P., & **Wu, K.** (2023). Static and Dynamic Magnetization Models of Magnetic Nanoparticles: An Appraisal. *Physica Scripta*, 98, 082002.
  9. Saha, R., Sanger, Z., Bloom, R., Benally, O., **Wu, K.**, Tonini, D., Low, W.C., Keirstead, S., Netoff, T.I., & Wang, J.P. (2023). Micromagnetic stimulation ( $\mu$ MS) dose-response of the rat sciatic nerve. *Journal of Neural Engineering*, 20, 036022.
  10. Yari, P., Rezaei, B., Dey, C., Chugh, V.K., Veerla, N.V.R.K., Wang, J.P. & **Wu, K.** (2023). Magnetic Particle Spectroscopy for Point-of-Care: A Review on Recent Advances. *Sensors*, 23(9), p.4411.
  11. Chugh, V.K., Liang, S., Yari, P., **Wu, K.**, & Wang, J.P. (2023). A method for multiplexed and volumetric-based magnetic particle spectroscopy bioassay: mathematical study. *Journal of Physics D: Applied Physics*, 56, 315001.
  12. Tonini, D., **Wu, K.**, Saha, R., & Wang, J.P. (2023). Magnetic field detection using spin-torque nano-oscillator combined with magnetic flux concentrator. *AIP Advances*, 13(3), 035228.
  13. Dey, C., Yari, P., & **Wu, K.** (2023). Recent advances in magnetoresistance biosensors: a short review. *Nano Futures*, 7, 012002.
  14. Su, D., **Wu, K.**, Srinivasan, K., Nemati, Z., Zamani, R., Chugh, V.K., Saha, R., Franklin, R., Modiano, J., Stadler, B. and Wang, J.P. (2023). Ultra-Flexible Giant Magnetoresistance Biosensors for Lab-on-A-Needle Biosensing. *Advanced Materials Interfaces*, 2201417.
  15. Su, D., Um, J., Moreno, J., Nemati, Z., Srinivasan, K., Chen, J., Zamani, R., Shore, D., **Wu, K.**, Kosel, J., Modiano, J., Franklin, R., Wang, J.P., & Stadler, B. (2023). GMR Biosensing with Magnetic Nanowires as Labels for the Detection of Osteosarcoma Cells. *Sensors and Actuators A: Physical*, 350, 114115.
  16. Chugh, V.K., di Girolamo, A., V.K., Krishna, V.D., **Wu, K.**, Cheeran, M.C., & Wang, J.P. (2023). Frequency and Amplitude Optimizations for Magnetic Particle Spectroscopy Applications. *Journal of Physical Chemistry C*, 2023, 127, 1, 450–460.
- 2022**
17. Tonini, D., **Wu, K.**, Saha, R., & Wang, J.P. (2022). Feasibility study of magnetic sensing for detecting single-neuron action potentials. *Annals of Biomedical Science and Engineering*, 6(1), 019-029.
  18. **Wu, K.**, Chugh, V.K., Krishna, V.D., Wang, A. (Y.Q.), Gordon, T.D., Cheeran, M.C., & Wang, J.P. (2022). Five-Minute Magnetic Nanoparticle Spectroscopy-Based Bioassay for Ultrafast Detection of SARS-CoV-2 Spike Protein. *ACS Applied Nano Materials*, 2022, 5, 12, 17503–17507.
  19. Liang, S., Sutham, P., **Wu, K.**, Mallikarjunan, K., & Wang, J.P. (2022). Giant Magnetoresistance Biosensors for Food Safety Applications. *Sensors*, 22, 15, 5663
  20. **Wu, K.**, Liu, J., Chugh, V.K., Liang, S., Saha, R., Krishna, V.D., Cheeran, M.C., & Wang, J.P. (2022). Magnetic Nanoparticles and Magnetic Particle Spectroscopy-based Bioassays: A 15-year Recap. *Nano Futures*, 2022, 6, 022001.
  21. **Wu, K.**, Tonini, D., Liang, S., Saha, R., Chugh, V.K., & Wang, J.P. (2022). Giant Magnetoresistance Biosensors in Biomedical Applications. *ACS Applied Materials & Interfaces*, 2022, 14, 8, 9945–9969.

22. Saha, R., Faramarzi, S., Bloom, R., Benally, O.J., **Wu, K.**, di Girolamo, A., Tonini, D., Keirstead, S.A., Low, W.C., Netoff, T.I., & Wang, J.P. (2022). Strength-frequency curve for micromagnetic neurostimulation through excitatory postsynaptic potentials (EPSPs) on rat hippocampal neurons and numerical modeling of magnetic microcoil ( $\mu$ coil). *Journal of Neural Engineering*, 19, 016018.
23. Saha, R., **Wu, K.**, Bloom, R., Liang, S., Tonini, D., & Wang, J.P. (2022). A review on magnetic and spintronic neurostimulation: challenges and prospects. *Nanotechnology*, 33, 182004.

## 2021

24. **Wu, K.**, Chugh, V.K., Krishna, V.D., di Girolamo, A., Wang, A. (Y.Q.), Saha, R., Liang, S., Cheeran, M.C., & Wang, J.P. (2021). One-Step, Wash-free, Nanoparticle Clustering-Based Magnetic Particle Spectroscopy Bioassay Method for Detection of SARS-CoV-2 Spike and Nucleocapsid Proteins in the Liquid Phase. *ACS Applied Materials & Interfaces*, 2021, 13, 37, 44136–44146.
25. Liu, J., **Wu, K.**, He, S., Bai, J., Xu, Y., & Wang, J.P. (2021). Large Superparamagnetic FeCo Nanocubes for Magnetic Theranostics. *ACS Applied Nano Materials*, 2021, 4, 9, 9382–9390.
26. Chugh, V.K., **Wu, K.**, Krishna, V.D., di Girolamo, A., Bloom, R.P., Wang, A. (Y.Q.), Saha, R., Liang, S., Cheeran, M.C., & Wang, J.P. (2021). Magnetic Particle Spectroscopy with One-Stage Lock-In Implementation for Magnetic Bioassays with Improved Sensitivities. *Journal of Physical Chemistry C*, 2021, 125, 31, 17221–17231.
27. **Wu, K.**, Liu, J., Saha, R., Ma, B., Su, D., Chugh, V.K., & Wang, J.P. (2021). Stable and Monodisperse Iron Nitride Nanoparticle Suspension for Magnetic Diagnosis and Treatment: Development of Synthesis and Surface Functionalization Strategies. *ACS Applied Nano Materials*, 2021, 4, 5, 4409–4418.
- Available for **Technology Commercialization**
28. **Wu, K.**, Liu, J., Saha, R., Peng, C., Su, D., Wang, A. (Y.Q.), & Wang, J.P. (2021). Investigation of Commercial Iron Oxide Nanoparticles: Structural and Magnetic Property Characterization. *ACS Omega*, ACS Omega, 2021, 6, 9, 6274–6283.
29. **Wu, K.**, Chugh, V.K., di Girolamo, A., Liu, J., Saha, R., Su, D., Krishna, V.D., Nair, A., Davies, W., Wang, A. (Y.Q.), Cheeran, M.C., & Wang, J.P. (2021). A Portable Magnetic Particle Spectrometer for Future Rapid and Wash-Free Bioassays. *ACS Applied Materials & Interfaces*, 2021, 13, 7, 7966–7976.

## 2020

30. **Wu, K.**, Saha, R., Su, D., Krishna, V.D., Liu, J., Cheeran, M.C., & Wang, J.P. (2020). Magnetic Nanosensor-Based Virus and Pathogen Detection Strategies Before and During COVID-19. *ACS Applied Nano Materials*, 2020, 3, 10, 9560–9580.
31. Su, D., **Wu, K.**, Saha, R., Liu, J., & Wang, J.P. (2020). Magnetic Nanotechnologies for Early Cancer Diagnostics with Liquid Biopsies: A Review. *Journal of Cancer Metastasis and Treatment*, 2020; 6:19.
32. Saha, R., **Wu, K.**, Su, D., & Wang, J.P. (2020). Spin current nano-oscillator (SCNO) as a potential frequency-based, ultra-sensitive magnetic biosensor: a simulation study. *Nanotechnology*, 31, 375501.
33. **Wu, K.**, Liu, J., Saha, R., Man, B., Su, D., Peng, C., Sun, J., & Wang, J.P. (2020). Irregularly Shaped Iron Nitride Nanoparticles as A Potential Candidate for Biomedical Applications: From Synthesis to Characterization. *ACS Omega*, 2020, 5, 20, 11756–11767.
34. **Wu, K.**, Su, D., Saha, R., Liu, J., Chugh, V.K., & Wang, J.P. (2020). Magnetic Particle Spectroscopy: A Short Review of Applications using Magnetic Nanoparticles. *ACS Applied Nano Materials*, 2020, 3, 6, 4972–4989.

35. **Wu, K.**, Liu, J., Saha, R., Su, D., Krishna, V.D., Cheeran, M.C., & Wang, J.P. (2020). Magnetic Particle Spectroscopy for Detection of Influenza A Virus Subtype H1N1. *ACS Applied Materials & Interfaces*, 12(12), 13686-13697.
- **Featured on IEEE Spectrum**
36. Feng, Y., Chen, J-Y., **Wu, K.**, & Wang, J.P. (2020). Design and fabrication of integrated magnetic field sensing system with enhanced sensitivity. *Journal of Magnetism and Magnetic Materials*, 166728.
37. Liu, J., Su, D., **Wu, K.**, & Wang, J.P. (2020). High-moment magnetic nanoparticles. *Journal of Nanoparticle Research*, 22(3), 1-16.
38. **Wu, K.**, Su, D., Saha, R., & Wang, J.P. (2020). Deterministic Field-free Switching of a Perpendicularly Magnetized Ferromagnetic Layer via the Joint Effects of Dzyaloshinskii-Moriya Interaction, Damping-like and Field-like Spin-orbit Torques: An Appraisal. *Journal of Physics D: Applied Physics*, 53, 205002.
39. Su, D., **Wu, K.**, Saha, R., Peng, C., & Wang, J.P. (2020). Advances in Magnetoresistive Biosensors. *Micromachines*, 2020, 11, 34.

## 2019

40. **Wu, K.**, Su, D., Saha, R., & Wang, J.P. (2019). Spin-orbit Torque and Spin Hall Effect-based Cellular Level Therapeutic Spintronic Neuromodulator: A Simulation Study. *Journal of Physical Chemistry C*, 123, 40, 24963-24972.
41. **Wu, K.**, Su, D., Liu, J., Saha, R., & Wang, J.P. (2019). Magnetic nanoparticles in nanomedicine: a review of recent advances. *Nanotechnology*, 30, 50, 502003.
42. **Wu, K.**, Liu, J., Su, D., Saha, R., & Wang, J.P. (2019). Magnetic Nanoparticle Relaxation Dynamics-Based Magnetic Particle Spectroscopy for Rapid and Wash-Free Molecular Sensing. *ACS Applied Materials & Interfaces*, 11, 26, 22979-22986.
43. **Wu, K.**, Su, D., Saha, R., Liu, J., & Wang, J.P. (2019). Investigating the Effect of Magnetic Dipole-Dipole Interaction on Magnetic Particle Spectroscopy (MPS): Implications for Magnetic Nanoparticle-based Bioassays and Magnetic Particle Imaging (MPI). *Journal of Physics D: Applied Physics*, 52, 33, 335002.
44. **Wu, K.**, Su, D., Saha, R., Wong, D., & Wang, J.P. (2019). Magnetic Particle Spectroscopy-based Bioassays: Methods, Applications, Advances, and Future Opportunities. *Journal of Physics D: Applied Physics*, 52, 17, 173001.
45. **Wu, K.**, Su, D., Liu, J., & Wang, J.P. (2019). Estimating Saturation Magnetization of Superparamagnetic Nanoparticles from Liquid Phase. *Journal of Magnetism and Magnetic Materials*, 471, 394-399.
46. Su, D., **Wu, K.**, Krishna, V., Klein, T., Liu, J., Feng, Y., Perez A.M., Cheeran, M.C.-J., & Wang, J.P. (2019). Detection of Influenza A Virus in Swine Nasal Swab Samples With A Wash-Free Magnetic Bioassay and A Handheld Giant Magnetoresistance Sensing System. *Frontiers in Microbiology*, 10, 1077.
47. Su, D., **Wu, K.**, Saha, R., & Wang, J.P. (2019). Tunable magnetic domain walls for therapeutic neuromodulation at cellular level: Stimulating neurons through magnetic domain walls. *Journal of Applied Physics*, 126, 183902.
- **Featured on AIP Scilight**
  - **Selected as Journal Cover, Volume 126, Issue 18**
48. Su, D., **Wu, K.**, & Wnag, J.P. (2019). Large-Area GMR Bio-Sensors based on Reverse Nucleation Switching Mechanism. *Journal of Magnetism and Magnetic Materials*, 473, 484-489.

49. Saha, R., **Wu, K.**, Su, D., & Wang, J.P. (2019). Tunable magnetic skyrmions in spintronic nanostructures for cellular-level magnetic neurostimulation. *Journal of Physics D: Applied Physics*, 52, 46, 465002.
50. Sun, J., **Wu, K.**, Su, D., Guo, G., & Shi, Z. (2019). Continuous Separation of Magnetic Beads Using a Y-shaped Microfluidic System Integrated with Hard-magnetic Elements. *Journal of Physics D: Applied Physics*, 53, 3, 035004.
51. Liu, J., Zhang, D., **Wu, K.**, Hang, X., & Wang, J.P. (2019). Magnetic field enhanced coercivity of Fe nanoparticles embedded in antiferromagnetic MnN films. *Journal of Physics D: Applied Physics*, 53, 3, 035003.
52. Klein, T., Wang, W., Yu, L., **Wu, K.**, Boylan, K., Vogel, R. I., Skubitz, A., & Wang, J.P. (2019). Development of a multiplexed giant magnetoresistive biosensor array prototype to quantify ovarian cancer biomarkers. *Biosensors & Bioelectronics*, 126, 301-307.

## 2018

53. Krishna, V.D., **Wu, K.**, Su, D., Perez, A.M., & Wang, J.P. (2018). Nanotechnology: Review of Concepts and Potential Application of Sensing Platforms in Food Safety. *Food Microbiology*, 75, 47-54.

## 2017

54. **Wu, K.**, Klein, T., Krishna, V.D., Su, D., Perez, A.M., & Wang, J.P. (2017). Portable GMR Handheld Platform for the Detection of Influenza A Virus. *ACS Sensors*, 2(11), 1594-1601.
- **Featured on News**
55. **Wu, K.**, Schliep, K., Zhang, X., Liu, J., Ma, B., & Wang, J.P. (2017). Characterizing Physical Properties of Superparamagnetic Nanoparticles in Liquid Phase Using Brownian Relaxation. *Small*, 13(22), 1604135.
- **Selected as Journal Cover, Volume 13, No. 22**
56. **Wu, K.**, Tu, L., Su, D., & Wang, J.P. (2017). Magnetic Dynamics of Ferrofluids: Mathematical Models and Experimental Investigations. *Journal of Physics D: Applied Physics*, 50, 8, 085005.
57. **Wu, K.**, & Wang, J.P. (2017). Magnetic Hyperthermia Performance of Magnetite Nanoparticle Assemblies Under Different Driving Fields. *AIP Advances*, 7, 5, 056327. [**Highly Cited**]
58. Feng, Y., Liu, J., Klein, T., **Wu, K.**, & Wang, J.P. (2017). Localized Detection of Reversal Nucleation Generated by High Moment Magnetic Nanoparticles Using a Large-area Magnetic Sensor. *Journal of Applied Physics*, 122, 123901.

## 2016

59. **Wu, K.**, Batra, A., Jain, S., & Wang, J.P. (2016). Magnetization Response Spectroscopy of Superparamagnetic Nanoparticles Under Mixing Frequency Fields. *IEEE Transactions on Magnetism*, 52, 7, 7369960.
60. **Wu, K.**, Ye, C., Liu, J., Wang, Y., Feng, Y., & Wang, J.P. (2016). In Vitro Viscosity Measurement on Superparamagnetic Nanoparticle Suspensions. *IEEE Transactions on Magnetism*, 52, 7, 7405335.
61. Krishna, V. D., **Wu, K.**, Perez, A.M., & Wang, J.P. (2016). Giant Magnetoresistance-based Biosensor for Detection of Influenza A Virus. *Frontiers in Microbiology*, 7, 400. (#Co-first authorship).
62. Liu, J., **Wu, K.**, & Wang, J.P. (2016). Magnetic properties of cubic FeCo nanoparticles with anisotropic long chain structure. *AIP Advances*, 6, 5, 056126.

## 2015

63. **Wu, K.**, Liu, J., Wang, Y., Ye, C., Feng, Y., & Wang, J.P. (2015). Superparamagnetic nanoparticlebased viscosity test. *Applied Physics Letters*, 107, 5, 053701.

64. **Wu, K.**, Batra, A., Jain, S., Ye, C., Liu, J., & Wang, J. P. (2015). A simulation study on superparamagnetic nanoparticle based multi-tracer tracking. *Applied Physics Letters*, 107, 17, 173701.
65. **Wu, K.**, Wang, Y., Feng, Y., Yu, L., & Wang, J.P. (2015). Colorize magnetic nanoparticles using a search coil based testing method. *Journal of Magnetism and Magnetic Materials*, 380, 251-254.

2014

66. Yu, L., Liu, J., **Wu, K.**, Klein, T., Jiang, Y., & Wang, J.P. (2014). Evaluation of Hyperthermia of Magnetic Nanoparticles by Dehydrating DNA. *Scientific Reports*, 4, 07216.
67. Tu, L., **Wu, K.**, Klein, T., & Wang, J.P. (2014). Magnetic nanoparticles colourization by a mixing-frequency method. *Journal of Physics D: Applied Physics*, 47, 15, 155001.c

## CONFERENCE PAPERS

1. Saha, R., **Wu, K.**, & Wang, J. P. (2023). Impact of microcoil shape and the efficacy of soft magnetic material cores in focal micromagnetic neurostimulation. In 2023 11th International IEEE/EMBS Conference on Neural Engineering (NER) (pp. 1-4). *IEEE*.
2. Chugh, V.K., **Wu, K.**, Nair, A., di Girolamo, A., Schealler, J., Vuong, H., Davies, W., Wall, A., Whitely, E., Saha, R., Su, D., and Wang, J.P. (2020). Magnetic Particle Spectroscopy-Based Handheld Device for Wash-Free, Easy-to-Use, and Solution-Phase Immunoassay Applications. *Proceedings of the 2020 Design of Medical Devices Conference*. In 2020 Design of Medical Devices Conference. Minneapolis, Minnesota, USA. April 6–9, 2020. V001T10A011. ASME.
3. **Wu, K.**, Yu, L., Zheng, X., Wang, Y., Feng, Y., Tu, L. & Wang, J.P. (2014). Viscosity effect on the brownian relaxation based detection for immunoassay applications. In Engineering in Medicine and Biology Society (EMBC), 2014 36th Annual International Conference of the IEEE (pp. 2769-2772). *IEEE*.

## COMMENTARIES

1. Liang, S., **Wu, K.**, & Wang, J.P. (2022) Short Commentary - Giant Magnetoresistance-Based Biosensors for Next Generation High throughput, Point-of-Care Cancer Diagnosis. *21st Century Pathology*, 2, 2, 118.
2. Wang, J.P., Wang, W., Klein, T., & **Wu, K.** (2018) Applying Nanomagnetic Technology for the Detection of Heavy Metals from Drinking Water. *Open Rivers*, Issue 10.

## PATENTS

1. Wang, J.P., Chugh, V.K., **Wu, K.** Methods for Separation and Enrichment of Magnetic Nanoparticle Conjugates in Magnetic Particle Spectroscopy-based Assays. Submitted.
2. Wang, J.P., **Wu, K.**, Cheeran, M.C.-J., Chugh, V.K., Krishna Bhat, V.D. Magnetic Particle Spectroscopy. Application: 63/366,384.
3. Wang, J.P., **Wu, K.**, Ma, B., & Liu, J. *Iron Nitride Nanoparticle Suspension*. Application: US17/659,953. Publication: US20220354973A1.
4. **Wu, K.**, Chugh, V.K., & Wang, J.P. *Magnetic Particle Spectroscopy Method and Device*. Application: PCT/US2021/070401. Publication: WO2021212144A1. EP4136439A1. US20230204542A1.
5. Wang, J.P., Saha, R., Su, D., & **Wu, K.** *Nanopatterned Soft-magnetic Material-based Microcoil for Highly Focused, Low-power, Implantable Magnetic Stimulation*. Application: PCT/US2021/025322. Publication: WO2021202840A1. US20230173293A1.
6. **Wu, K.**, & Wang, J.P. *Magnetic Nanoparticle Characterization*. Application: PCT/US2018/016233. Publication: WO2018144599A1.

## BOOKS

1. Magnetic Nanoparticles in Nanomedicine. **Wu, K.**, Wang, J.P. (Ed.). (2024). Elsevier B.V. ISBN: 9780443216688.

## BOOK CHAPTERS

1. Hua, C., **Wu, K.**, & Yu, W. Chapter 2. Micromagnetic Simulation Tools: OOMMF, Mumax3, and COMSOL Multiphysics. **Wu, K.**, Wang, J.P. (Ed.). (2024). Magnetic Nanoparticles in Nanomedicine. Elsevier B.V. ISBN: 9780443216688.
2. Liu, J., **Wu, K.**, & Wang, J.P. Chapter 3. Physical Methods for the Synthesis of MNPs. **Wu, K.**, Wang, J.P. (Ed.). (2024). Magnetic Nanoparticles in Nanomedicine. Elsevier B.V. ISBN: 9780443216688.
3. Rezaei, B., Yari, P., Mostufa, S., & **Wu, K.** Chapter 6. Characterization Methods for MNPs. **Wu, K.**, Wang, J.P. (Ed.). (2024). Magnetic Nanoparticles in Nanomedicine. Elsevier B.V. ISBN: 9780443216688.
4. Saha, R., Hopper, M.S., Liang, S., **Wu, K.**, & Wang, J.P. Chapter 9. MNPs for Neurostimulation. **Wu, K.**, Wang, J.P. (Ed.). (2024). Magnetic Nanoparticles in Nanomedicine. Elsevier B.V. ISBN: 9780443216688.
5. Liang, S., **Wu, K.**, & Wang, J.P. Chapter 10. Magnetoresistive (MR) Biosensor. **Wu, K.**, Wang, J.P. (Ed.). (2024). Magnetic Nanoparticles in Nanomedicine. Elsevier B.V. ISBN: 9780443216688.
6. Chugh, V.K., Yari, P., **Wu, K.**, & Wang, J.P. Chapter 11. Magnetic Particle Spectroscopy (MPS) Biosensor. **Wu, K.**, Wang, J.P. (Ed.). (2024). Magnetic Nanoparticles in Nanomedicine. Elsevier B.V. ISBN: 9780443216688.
7. **Wu, K.**, Su, D., Saha, R., & Wang, J. P. Chapter 2. [Giant Magnetoresistance \(GMR\) Materials and Devices for Biomedical and Industrial Applications](#). Luo, J., Wang, K., Yang, M. (Ed.). (2022). [Spintronics: Materials, Devices, and Applications](#). John Wiley & Sons Limited. ISBN: 9781119698975.
8. **Wu, K.**, Su, D., Feng, Y., & Wang, J. P. Chapter 13. Magnetic Nanoparticle-based Biosensing. Thanh, N. T. (Ed.). (2018). [Clinical Applications of Magnetic Nanoparticles](#). CRC Press. ISBN: 9781138051553.

## INVITED TALKS

1. Magnetic Particle Spectroscopy Point-of-Care Device for Disease Diagnosis. The National Institute of Standards and Technology (NIST). Apr 20, 2023. Virtual.
2. Magnetic Particle Spectroscopy Point-of-Care Device for Disease Diagnosis. Department of Electrical and Computer Engineering, Texas Tech University. Oct 7, 2022. Lubbock, TX, U.S.
3. Magnetic Biosensors for Point-of-Care (POC) Diagnostics. Department of Electrical and Computer Engineering, University of Minnesota. Sep 16, 2022. Virtual.
4. Magnetic Biosensors for Point-of-Care (POC) Diagnostics. Department of Electrical and Computer Engineering, Texas Tech University. Feb 7, 2022. Lubbock, TX, U.S.
5. Magnetic Biosensors for Point-of-Care (POC) Diagnostics. Department of Electrical and Computer Engineering, Texas A&M University. Jan 28, 2022. Virtual.
6. Portable GMR Handheld Platform for the Detection of Influenza A Virus. NVE Corporation. May 10, 2019. Eden Prairie, MN, U.S.
7. Multiplex Magnetic Nanobio Chip and Detection System. The 3M Tech Forum Biosciences Chapter and Scienion. Apr 4, 2017. St. Paul, MN, U. S.

8. Multiplex Magnetic Nanobio Chip and Detection System. The Medtronic Tech Forum Biosciences Chapter and Scienion. Apr 5, 2017. Minneapolis, MN, U. S.

## SELECTED CONFERENCE PRESENTATIONS

1. [Poster] **Wu, K.**, Kumar, V. C., Krishna, V. D., di Girolamo A., Wang, Y. Q. A., Saha, R., Liang, S., Cheeran, M. C., & Wang, J. P. Handheld Magnetic Particle Spectroscopy (MPS) for Rapid, One-step, Wash-free Detection of SARS-CoV-2 Spike and Nucleocapsid Proteins in Liquid Phase. The 15th Joint MMM-INTERMAG Conference (2022 Joint), January 10-14, 2022. New Orleans, U.S.

--- Best Poster Award

2. [Poster] Saha, R., **Wu, K.**, Su, D., & Wang, J. P. Highly Tunable, Ultra-Low Power, Cellular-Level, Magnetic Neurostimulation through Flexible Spintronic Nanostructures. Annual Conference and Retreat for the Institute for Engineering in Medicine, September 23, 2019. Minneapolis, U.S.

--- Best Poster Award (1<sup>st</sup> place)

3. [Poster] Su, D., **Wu, K.**, Peng, C., Saha, R., & Wang, J. P. Large-Scale, High-Resolution Brain Sensing with Flexible Magnetic Nanosensors. Annual Conference and Retreat for the Institute for Engineering in Medicine, September 23, 2019. Minneapolis, U.S.

--- Best Poster Award (2<sup>nd</sup> place)

4. [Poster] **Wu, K.**, Su, D., Krishna, V. D., Klein, T., Perez, A. M., & Wang, J. P. A GMR Handheld Platform for One-step and Rapid Biomarker Detection. CIGS Annual Research Showcase, November 10, 2017. Minneapolis, U.S.

--- Best Poster Award (1<sup>st</sup> place)

5. [Poster] Su, D., **Wu, K.**, & Wang, J. P. Giant Magnetoresistance Based Handheld Platform for Rapid Detection of Influenza A Virus. Annual Conference and Retreat for the Institute for Engineering in Medicine, November 6, 2017. Minneapolis, U.S.

--- Best Poster Award (3<sup>rd</sup> place)

6. [Poster] Su, D., **Wu, K.**, & Wang, J. P. Giant Magnetoresistance Based Handheld Platform for Rapid Detection of Influenza A Virus. The 62nd MMM Conference, November 6-10, 2017. Pittsburgh, U.S.

--- Best Poster Award

7. [Poster] Krishna, V. D., **Wu, K.**, Klein, T., Su, D., Perez, A. M., Wang, J. P., & Cheeran M. C. Influenza A Virus Detection Using A Giant Magnetoresistance (GMR) Biosensing Portable Handheld Device. College of Veterinary Medicine Research Day. October 4, 2017. St. Paul, U.S.

--- Best Poster Award (1<sup>st</sup> place)

8. [Poster] **Wu, K.**, & Wang, J. P. Surface Functionalized Superparamagnetic Nanoparticles for Multiplex Detection Immunoassays. Annual Conference and Retreat for the Institute for Engineering in Medicine, September 26, 2016. Minneapolis, U.S.

--- Best Poster Award (2<sup>nd</sup> place)

9. [Poster] **Wu, K.**, & Wang, J. P. Smart Magnetic Nanoparticles for Multiplex Detection of Diseases. IEEE Magnetics Society Summer School, July 10 - 15, 2016. Sendai, Japan.

--- Bronze Poster Award

## CONFERENCE PRESENTATIONS

1. [Talk] Saha, R., **Wu, K.**, & Wang, J. P. Impact of microcoil shape and the efficacy of soft magnetic material cores in focal micromagnetic neurostimulation. The 11th International IEEE EMBS Conference on Neural Engineering, April 25 - April 27, 2023. Baltimore, MD, USA

2. [Poster] Kumar, V. C., **Wu, K.**, Krishna, V. D, Cheeran, M. C. J, & Wang, J. P. Frequency Domain Studies on Single- and Multicore Magnetic Nanoparticles in Volumetric Magnetic Particle Spectroscopy (MPS). The 67th Annual Conference on Magnetism and Magnetic Materials (MMM 2022), October 31 - November 4, 2022. Minneapolis, U.S.
3. [Poster] Tonini, D., **Wu, K.**, Saha, R., & Wang, J. P. Magnetic Field Detection Using Spin Torque Nano- Oscillator Combined with Magnetic Flux Concentrators. The 67th Annual Conference on Magnetism and Magnetic Materials (MMM 2022), October 31 - November 4, 2022. Minneapolis, U.S.
4. [Poster] Saha, R., Sanger, Z., Bloom, R., Benally, O., **Wu, K.**, Tonini, D., Low, W., Keirstead, S., Netoff, T., & Wang, J. P. In vivo Micromagnetic Stimulation of the Rat Sciatic Nerve. The 67th Annual Conference on Magnetism and Magnetic Materials (MMM 2022), October 31 - November 4, 2022. Minneapolis, U.S.
5. [Poster] Kumar, V. C., **Wu, K.**, Nair, A., di Girolamo, A., Seekaew, N., Nguyen, L., Saha, R., Davies, W., Krishna, V. D., Su, D., Cheeran, M. C. J, & Wang, J. P. Portable Magnetic Particle Spectroscopy (MPS) Device for Future Rapid, One-step and Wash-free Bioassays. The 65th Annual Conference on Magnetism and Magnetic Materials (MMM 2020), November 2 - 6, 2020. Virtual Conference.
6. [Poster] **Wu, K.**, & Wang, J. P. Smart Magnetic Nanoparticles for Multiplexed Immunoassays & Point-of-Care Diagnosis. 61st MMM Conference, October 31 - November 4, 2016. New Orleans, U.S.
7. [Poster] Liu, J., **Wu, K.**, & Wang, J. P. Magnetic properties of cubic FeCo nanoparticles with anisotropic long chain structure. 13th Joint MMM-Intermag Conference, January 11 - 15, 2016. San Diego, U.S.
8. [Poster] **Wu, K.**, Batra, A., Jain, S., & Wang, J. P. Magnetization Response Spectroscopy of Superparamagnetic Nanoparticles Under Mixing Frequency Fields. 13th Joint MMM-Intermag Conference, January 11 - 15, 2016. San Diego, U.S.
9. [Poster] **Wu, K.**, Ye, C., Liu, J., Wang, Y., Feng, Y., & Wang, J. P. In Vitro Viscosity Measurement on Superparamagnetic Nanoparticle Suspensions. 13th Joint MMM-Intermag Conference, January 11 - 15, 2016. San Diego, U.S.
10. [Poster] **Wu, K.**, Yu, L., Zheng, X., Wang, Y., Feng, Y., Tu, L., & Wang, J. P. Viscosity Effect on The Brownian Relaxation Based Detection for Immunoassay Applications. 36th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, August 26 - 30, 2014. Chicago, U.S.

## TEACHING

1. ECE 5332 002 Introduction to Magnetic Materials Fall 2023, Texas Tech University
  - Graduate level, 3 credit hours
2. ECE5332 001 Spintronic Devices and Applications Spring 2023, Texas Tech University
  - Graduate level, 3 credit hours
  - Student evaluation: 4.9/5.0
4. ECE2372 Modern Digital System Design Fall 2022, Texas Tech University
  - Undergraduate level, 3 credit hours
  - Student evaluation: 4.1/5.0

## STUDENT ADVISING

### PhD Students

Parsa Yari, ECE

09/2022-Present

- Research topic: Magnetic Particle Spectroscopy; Magnetic Particle Imaging.

*Awards: Russell H. Seacat Scholarship Award (2022), Edward E. Whitacre Jr. Distinguished Student Fellowship (2022), BioMed Journal Club Best Student Presentation Award 3rd Place (2023), Russel H. Seacat Competitive Scholarship (2023), ECE Outstanding Publication Award (2023).*

Bahareh Rezaei, ECE

09/2023-Present

- Research topic: Synthesis, Characterization & Functionalization of Magnetic Nanoparticles; Magnetic Hyperthermia; Magnetization Dynamics.

*Awards: TTU Distinguished Graduate Student Assistantship (DGSA, 2023).*

Shahriar Mostufa, ECE

09/2023-Present

- Research topic: Modeling of Plasmonic and Magnetic Biosensors; Magnetic Particle Imaging.

### **M.S. Students**

Naga V.R.K. Veerla, ECE

09/2022-05/2023

### **Undergraduate Students**

Sean Sanders, ChemE

09/2022-05/2023

Haotong Wang, ChemE

09/2022-Present

*Awards: TTU Honors College (2022).*

Kanglin Xu, CS

09/2022-Present

*Awards: TTU Honors College (2022), TrUE Undergraduate Project Funding Award (2023), Grace Lasater Allensworth Scholarship (2023).*

Nana Mprah, ChemE

09/2022-12/2022

Helene Deng, ECE

09/2022-12/2022

*TTU Tech Intrapreneurship Program (TIP).*

### **High School Students**

Sahil Hora, Heritage High School, Frisco, TX

06/2023-08/2023

Kaitlyn Villarreal, Frenship High School, Lubbock, TX

06/2023-08/2023

*TTU Engineering Research Internship Experience (ERIE) Program.*

## **THESIS/ORAL EXAM COMMITTEE**

### **Oral Exam Committee**

Akhil Bandi, ECE, M.S.

03/2023

Vikranth Sai Charan Tej Reddy Vubbara, ECE, M.S.

04/2023

Neelima Bobba Subramanyam, ECE, M.S.

06/2023

## **PROFESSIONAL MEMBERSHIPS**

Senior Member of IEEE

2023-Present

Member of ACS

2022-Present