





## Shan X. Wang

Leland T. Edwards Professor in the School of Engineering and Professor of Electrical Engineering and, by courtesy, of Radiology (Molecular Imaging Program at Stanford)

Materials Science and Engineering

 NIH Biosketch available Online

 Resume available Online

### CONTACT INFORMATION

- **Administrator**

Nuvia Pacheco - Administrative Associate

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**Tel** 650 723 0197

### Bio

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#### BIO

Dr. Wang is the Leland T. Edwards Professor in the School of Engineering and Professor of Materials Science and Engineering, jointly of Electrical Engineering and, by courtesy, of Radiology (Molecular Imaging Program at Stanford). He directs the Center for Magnetic Nanotechnology and is a leading expert in biosensors, information storage and spintronics. His research and inventions span across a variety of areas including magnetic biochips, in vitro diagnostics, cancer biomarkers, magnetic nanoparticles, magnetic sensors, magnetoresistive random access memory, and magnetic integrated inductors. He has over 300 publications, and holds 70 issued or pending patents in these and interdisciplinary areas. He was named an inaugural Fred Terman Fellow, and was elected a Fellow of the Institute of Electrical and Electronics Engineers (IEEE), a Fellow of American Physical Society (APS) and a Fellow of National Academy of Inventors (FNAI) for his seminal contributions to magnetic materials, nanosensors and cancer diagnostics. His team won the Grand Challenge Exploration Award from Gates Foundation (2010), the XCHALLENGE Distinguished Award (2014), and the Bold Epic Innovator Award from the XPRIZE Foundation (2017). He coauthored two textbooks: Magnetic Information Storage Technology (Academic Press) and Biochips and Medical Imaging (Wiley).

Dr. Wang cofounded six high-tech startups in Silicon Valley, including Curve Biosciences, Magic Lifescience, MagArray, and Nvigen. In 2023, Curve Biosciences demonstrated a circulating tumor DNA NGS assay, enabling early detection of liver cancer from cirrhosis with unprecedented sensitivity and specificity (both  $\geq 95\%$ ); Magic received a Gates Foundation grant and launched clinical trials to seek FDA clearance for its rapid NAT products at POC. In 2018 MagArray launched a first of its kind lung cancer early diagnostic assay based on protein cancer biomarkers and support vector machine (SVM). Through his participation and leadership in Cancer Nanotechnology Excellence, Semiconductor Research Corp (SRC) and Microelectronics Commons, he is actively engaged in the transformative R&D of healthcare, energy-efficient computing and edge AI.

#### ACADEMIC APPOINTMENTS

- Professor, Materials Science and Engineering
- Professor, Electrical Engineering
- Professor (By courtesy), Radiology - Rad/Molecular Imaging Program at Stanford

- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Maternal & Child Health Research Institute (MCHRI)
- Affiliate, Precourt Institute for Energy
- Member, Stanford Cancer Institute
- Affiliate, Stanford Woods Institute for the Environment
- Member, Wu Tsai Neurosciences Institute

## ADMINISTRATIVE APPOINTMENTS

- Associate Chair, Materials Science and Engineering, (2014-2019)

## HONORS AND AWARDS

- Achievement Award, IEEE Magnetism Society (2025)
- Fellow, National Academy of Inventors (2021)
- Leland T. Edwards Professor, Stanford University (2018)
- Bold Epic Innovator Award, XPRIZE Foundation (2017)
- Nokia Sensing XCHALLENGE Distinguished Award, XPRIZE Foundation (2014)
- Faculty Award, IBM (2013-4)
- Faculty Fellow, Stanford Center at Peking University (SCP KU) (2013)
- Fellow, American Physical Society (APS) (2012)
- Fellow, The Institute of Electrical and Electronics Engineers (IEEE) (2009)
- Keck Futures Initiative Award, National Academies (2006-7)
- Distinguished Lecturer, IEEE Magnetism Society (2001)
- Partnership Award, IBM (1999)
- Inaugural Frederick Terman Faculty Fellow, Stanford University (1994-97)
- CUSPEA Scholarship, Organized by Nobel Laureate TD Lee (1986)

## PROGRAM AFFILIATIONS

- Stanford SystemX Alliance

## PROFESSIONAL EDUCATION

- PhD, Carnegie Mellon University , Electrical and Computer Engineering (1993)

## COMMUNITY AND INTERNATIONAL WORK

- Fellow, Center for Innovation in Global Health (CIGH), Asia, Africa, America

## LINKS

- Wang Group Website: <https://wanggroup.stanford.edu>

## Research & Scholarship

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### CURRENT RESEARCH AND SCHOLARLY INTERESTS

Dr. Wang is the Leland T. Edwards Professor in the School of Engineering, Stanford University. He is a Professor of Materials Science & Engineering and jointly a Professor of Electrical Engineering, and by courtesy, a Professor of Radiology (Stanford School of Medicine). He directs the Center for

Magnetic Nanotechnology and is a leading expert in biosensors, information storage and spintronics. His research and inventions span across a variety of areas including magnetic biochips, in vitro diagnostics, cancer biomarkers, magnetic nanoparticles, magnetic sensors, magnetoresistive random access memory, and magnetic integrated inductors. He has over 300 publications, and holds 70 issued or pending patents in these and interdisciplinary areas. He was named an inaugural Fred Terman Fellow, and was elected a Fellow of the Institute of Electrical and Electronics Engineers (IEEE), a Fellow of American Physical Society (APS) and a Fellow of National Academy of Inventors for his seminal contributions to magnetic materials, nanosensors and cancer diagnostics. His team won the Grand Challenge Exploration Award from Gates Foundation (2010), the XCHALLENGE Distinguished Award (2014), and the Bold Epic Innovator Award from the XPRIZE Foundation (2017). He coauthored two textbooks: Magnetic Information Storage Technology (Academic Press) and Biochips and Medical Imaging (Wiley).

Dr. Wang cofounded six high-tech startups in Silicon Valley, including Curve Biosciences, Magic Lifescience, MagArray, and Flux Biosciences. In 2018 MagArray launched a first of its kind lung cancer early diagnostic assay based on protein cancer biomarkers and support vector machine (SVM). In 2023, Curve Biosciences demonstrated a circulating tumor DNA NGS assay, enabling early detection of liver cancer from cirrhosis with unprecedented sensitivity and specificity (both  $\geq 95\%$ ). Through his participation and leadership in Cancer Nanotechnology Excellence and Semiconductor Research Corp (SRC) programs, he is actively engaged in the transformative research of healthcare and is developing emerging memories for energy efficient computing and edge AI.

Dr. Wang obtained his PhD in Electrical and Computer Engineering from Carnegie Mellon University in 1993, MS in Physics from Iowa State University in 1988, and BS in Physics from the University of Science and Technology of China in 1986.

## CLINICAL TRIALS

- COMT Activity and Hypnotizability, Not Recruiting
- Identification of Circulating Tumor Cells in the Peripheral Blood of Lung Cancer Patients, Not Recruiting

## Teaching

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### COURSES

#### 2024-25

- Biochips and Medical Imaging: EE 225, MATSCI 225, SBIO 225 (Win)
- Great Inventions That Matter: MATSCI 83N (Aut)

#### 2023-24

- Biochips and Medical Imaging: EE 225, MATSCI 225 (Win)
- Great Inventions That Matter: MATSCI 83N (Aut)
- New Methods in Thin Film Synthesis: MATSCI 312 (Spr)

#### 2022-23

- Biochips and Medical Imaging: EE 225, MATSCI 225, SBIO 225 (Win)
- Great Inventions That Matter: MATSCI 83N (Aut)
- New Methods in Thin Film Synthesis: MATSCI 312 (Spr)

#### 2021-22

- Great Inventions That Matter: MATSCI 83N (Aut)

## STANFORD ADVISEES

### Doctoral Dissertation Reader (AC)

Ziad Ali, Yihang Chen, Jason Saunders, Prima Dewi Sinawang, Haotian Su, Steven Yee

### Postdoctoral Faculty Sponsor

William Hwang, Fen Xue

### Doctoral Dissertation Advisor (AC)

Katie Antilla, Jacob Bryan, Christopher Choi, Sydney Fultz-Waters

### Doctoral Dissertation Co-Advisor (AC)

Kenneth Brinson

### Master's Program Advisor

Hiranmai Mohan, Jane Nguyen, Will Salisbury, Aanya Tashfeen

### Doctoral (Program)

Myungheon(Young) Chin, Vivek Lam, Linkai Li, Itamar Terem

### Postdoctoral Research Mentor

Fen Xue

## GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Bioengineering (Phd Program)

## Publications

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### PUBLICATIONS

- **Detection of factor Xa activity using giant magnetoresistive biosensors.** *Analytica chimica acta*  
Lee, Y., Kim, S., Song, T. J., Wang, S. X., Lee, J. R.  
2024; 1331: 343347
- **Design and Validation of Specific Oligonucleotide Probes on Planar Magnetic Biosensors.** *Analytical chemistry*  
Kim, S., Im, J., Wang, S. X., Lee, J. R.  
2024
- **Enhanced spin-torque efficiency by metal insertion in the Pt/Co/MgO system** *PHYSICAL REVIEW B*  
Xue, F., Hwang, W., Klewe, C., Song, M., Su, H., Shafer, P., Tsai, W., Bao, X., Wang, S. X.  
2024; 110 (17)
- **Thermal Characterization of Ultrathin MgO Tunnel Barriers.** *Nano letters*  
Su, H., Kwon, H., Xue, F., Sato, N., Bhat, U., Tsai, W., Bosman, M., Asheghi, M., Goodson, K. E., Pop, E., Wang, S. X.  
2024
- **Experimental Demonstration of Field-Free STT-Assisted SOT-MRAM (SAS-MRAM) With Four Bits per SOT Programming Line** *IEEE ELECTRON DEVICE LETTERS*  
Hwang, W., Xue, F., Song, M., Hsu, C., Chen, T. C., Tsai, W., Bao, X., Wang, S. X.  
2024; 45 (10): 1800-1803
- **On-Device Continual Learning With STT-Assisted-SOT MRAM-Based In-Memory Computing** *IEEE TRANSACTIONS ON COMPUTER-AIDED DESIGN OF INTEGRATED CIRCUITS AND SYSTEMS*  
Zhang, F., Sridharan, A., Hwang, W., Xue, F., Tsai, W., Wang, S., Fan, D.  
2024; 43 (8): 2393-2404

- **Thermal optimization of two-terminal SOT-MRAM** *JOURNAL OF APPLIED PHYSICS*  
Su, H., Kwon, H., Hwang, W., Xue, F., Koroglu, C., Tsai, W., Asheghi, M., Goodson, K. E., Wang, S. X., Pop, E.  
2024; 136 (1)
- **The role of magnetic anisotropy in the magnetoresistance of Cr<sub>2</sub>O<sub>3</sub>/Al<sub>2</sub>O<sub>3</sub> thin film antiferromagnets** *AIP ADVANCES*  
Wisser, J. J., Xue, F., Wang, S. X., Suzuki, Y.  
2024; 14 (3)
- **Evaluation of restriction and Cas endonuclease kinetics using matrix-insensitive magnetic biosensors.** *Biosensors & bioelectronics*  
Im, J., Kim, S., Park, S., Wang, S. X., Lee, J. R.  
2024; 249: 116017
- **Unconventional Spin-Orbit Torques (SOT) in Sputtered Materials for High Density High Speed MRAM**  
Wang, S. X., IEEE  
IEEE.2024
- **High-Density STT-Assisted SOT-MRAM (SAS-MRAM) for Energy-Efficient AI Application**  
Xue, F., Hwang, W., Tsai, W., Wang, S. X., IEEE  
IEEE.2024
- **Real-time temperature correction for magnetoresistive biosensors integrated with temperature modulator.** *Biosensors & bioelectronics: X*  
Kim, S., Wang, S. X., Lee, J.  
2023; 14
- **Longitudinal analysis of anti-SARS-CoV-2 neutralizing antibody (NAb) titers in vaccinees using a novel giant magnetoresistive (GMR) assay.** *Sensors and actuators. B, Chemical*  
Ng, E., Choi, C., Wang, S. X.  
2023; 387: 133773
- **Field-free spin-orbit torque switching assisted by in-plane unconventional spin torque in ultrathin [Pt/Co]N.** *Nature communications*  
Xue, F., Lin, S. J., Song, M., Hwang, W., Klewe, C., Lee, C. M., Turgut, E., Shafer, P., Vaillonis, A., Huang, Y. L., Tsai, W., Bao, X., Wang, et al  
2023; 14 (1): 3932
- **Rapid, Point-of-Care Host-Based Gene Expression Diagnostics Using Giant Magnetoresistive Biosensors.** *ACS sensors*  
Sofia de Olazarra, A., Chen, F., Wang, T., Wang, S. X.  
2023
- **A magnetic hydrogel for the efficient retrieval of kidney stone fragments during ureteroscopy.** *Nature communications*  
Ge, T. J., Roquero, D. M., Holton, G. H., Mach, K. E., Prado, K., Lau, H., Jensen, K., Chang, T. C., Conti, S., Sheth, K., Wang, S. X., Liao, J. C.  
2023; 14 (1): 3711
- **Advances in point-of-care genetic testing for personalized medicine applications** *BIOMICROFLUIDICS*  
de Olazarra, A. S., Wang, S. X.  
2023; 17 (3): 031501
- **Observation of anti-damping spin-orbit torques generated by in-plane and out-of-plane spin polarizations in MnPd3.** *Nature materials*  
Dc, M., Shao, D. F., Hou, V. D., Vaillonis, A., Quarterman, P., Habiboglu, A., Venuti, M. B., Xue, F., Huang, Y. L., Lee, C. M., Miura, M., Kirby, B., Bi, et al  
2023
- **EFFICACY AND SAFETY OF A MAGNETIC HYDROGEL FOR STONE FRAGMENT REMOVAL: AN IN VITRO AND IN VIVO STUDY**  
Roquero, D., Ge, T., Holton, G. H., Mach, K. E., Kornberg, Z., Sun, R., Conti, S., Wang, S. X., Liao, J. C.  
LIPPINCOTT WILLIAMS & WILKINS.2023: E819
- **Energy Efficient Computing With High-Density, Field-Free STT-Assisted SOT-MRAM (SAS-MRAM)** *IEEE TRANSACTIONS ON MAGNETICS*  
Hwang, W., Xue, F., Zhang, F., Song, M., Lee, C., Turgut, E., Chen, T. C., Bao, X., Tsai, W., Fan, D., Wang, S. X.  
2023; 59 (3)
- **Large Spin-Orbit-Torque Efficiency and Room-Temperature Magnetization Switching in SrIrO<sub>3</sub>/Co-Fe-B Heterostructures** *PHYSICAL REVIEW APPLIED*

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- Li, P., Channa, S., Li, X., Alahmed, L., Tang, C., Yi, D., Riddiford, L., Wisser, J., Balakrishnan, P. P., Zheng, X., Lu, D., Vailionis, A., Wang, et al  
 2023; 23 (2)
- **Point of care testing of enzyme polymorphisms for predicting hypnotizability and postoperative pain.** *The Journal of molecular diagnostics* : JMD  
 Cortade, D. L., Markovits, J., Spiegel, D., Wang, S. X.  
 2023
  - **2-Terminal, High Density, and Magnetic Field Free SOT-MRAM**  
 Hwang, W., Xue, F., Tsai, W., Wang, S. X., IEEE  
 IEEE.2023
  - **Quantitative and rapid detection of morphine and hydromorphone at the point of care by an automated giant magnetoresistive nanosensor platform.** *Analytical and bioanalytical chemistry*  
 Cortade, D. L., Wang, S. X.  
 2022
  - **Giant Orbital Anisotropy with Strong Spin-Orbit Coupling Established at the Pseudomorphic Interface of the Co/Pd Superlattice.** *Advanced science (Weinheim, Baden-Wurttemberg, Germany)*  
 Kim, S., Pathak, S., Rhim, S. H., Cha, J., Jekal, S., Hong, S. C., Lee, H. H., Park, S., Lee, H., Park, J., Lee, S., Steinruck, H., Mehta, et al  
 2022: e2201749
  - **Magnetic supercluster particles for highly sensitive magnetic biosensing of proteins.** *Mikrochimica acta*  
 Kim, S., Kim, J., Im, J., Kim, M., Kim, T., Wang, S. X., Kim, D., Lee, J.  
 2022; 189 (7): 256
  - **From saliva to SNP: non-invasive, point-of-care genotyping for precision medicine applications using recombinase polymerase amplification and giant magnetoresistive nanosensors.** *Lab on a chip*  
 de Olazarra, A. S., Cortade, D. L., Wang, S. X.  
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  - **A GMR-based assay for quantification of the human response to influenza.** *Biosensors & bioelectronics*  
 Ravi, N., Chang, S. E., Franco, L. M., Nagamani, S. C., Khatri, P., Utz, P. J., Wang, S. X.  
 2022; 205: 114086
  - **An automated and mobile magnetoresistive biosensor system for early hepatocellular carcinoma diagnosis.** *Biosensors & bioelectronics*  
 Yao, C., Ng, E., Wang, S. X.  
 1800; 202: 113982
  - **Performance Benchmarking of Spin-Orbit Torque Magnetic RAM (SOT-MRAM) for Deep Neural Network (DNN) Accelerators**  
 Luo, Y., Kumar, P., Liao, Y., Hwang, W., Xue, F., Tsai, W., Wang, S. X., Naeemi, A., Yu, S., IEEE  
 IEEE.2022: 73-76
  - **A Self-Sustained Current Sensor for Smart Grid Application** *IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS*  
 Wang, Z., Hu, J., Ouyang, Y., Deng, Y., Zhao, G., He, J., Wang, S. X.  
 2021; 68 (12): 12810-12820
  - **Spin-orbit torques of an in-plane magnetized system modulated by the spin transport in the ferromagnetic Co layer** *APL MATERIALS*  
 Xue, F., Lin, S., Li, P., Hwang, W., Huang, Y., Tsai, W., Wang, S. X.  
 2021; 9 (10)
  - **Charge-spin interconversion in epitaxial Pt probed by spin-orbit torques in a magnetic insulator** *PHYSICAL REVIEW MATERIALS*  
 Li, P., Riddiford, L. J., Bi, C., Wisser, J. J., Sun, X., Vailionis, A., Veit, M. J., Altman, A., Li, X., Mahendra, D. C., Wang, S. X., Suzuki, Y., Emori, et al  
 2021; 5 (6)
  - **Large and robust charge-to-spin conversion in sputtered conductive WTex with disorder** *MATTER*  
 Li, X., Li, P., Hou, V., Mahendra, D. C., Nien, C., Xue, F., Yi, D., Bi, C., Lee, C., Lin, S., Tsai, W., Suzuki, Y., Wang, et al  
 2021; 4 (5): 1639-1653
  - **Tunable spin-orbit torque efficiency in in-plane and perpendicular magnetized [Pt/Co](n) multilayer** *APPLIED PHYSICS LETTERS*  
 Xue, F., Lin, S., Mahendra, D. C., Bi, C., Li, X., Tsai, W., Wang, S. X.

2021; 118 (4)

- **Giant Magnetoresistive Nanosensor Analysis of Circulating Tumor DNA Epidermal Growth Factor Receptor Mutations for Diagnosis and Therapy Response Monitoring.** *Clinical chemistry*  
Nesvet, J. C., Antilla, K. A., Pancirer, D. S., Lozano, A. X., Preiss, J. S., Ma, W. n., Fu, A. n., Park, S. M., Gambhir, S. S., Fan, A. C., Neal, J. W., Padda, S. K., Das, et al  
2021
- **Challenges toward Low-Power SOT-MRAM**  
Lin, S., Huang, Y., Song, M., Lee, C., Xue, F., Chen, G., Yang, S., Chang, Y., Wang, I., Hsin, Y., Su, Y., Wei, J., Pai, et al  
IEEE.2021
- **Ultrahigh Spin-Orbit Torque Efficiency at Spin Reorientation Transition State in Pt/Co Multilayer**  
Xue, F., Lin, S., Dc, M., Bi, C., Li, X., Tsai, W., Wang, S. X., IEEE  
IEEE.2021
- **A Novel Current Reconstruction Method Based on Elastic Net Regularization** *IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT*  
Zhao, G., Hu, J., He, J., Wang, S. X.  
2020; 69 (10): 7484–93
- **Diagnostics for SARS-CoV-2 detection: A comprehensive review of the FDA-EUA COVID-19 testing landscape.** *Biosensors & bioelectronics*  
Ravi, N., Cortade, D. L., Ng, E., Wang, S. X.  
2020; 165: 112454
- **Parametric Reconstruction of Multiple Line Currents Based on Magnetic Sensor Array** *IEEE TRANSACTIONS ON MAGNETICS*  
Zhao, G., Hu, J., Ma, H., He, J., Wang, S. X.  
2020; 56 (7)
- **Flow Homogenization Enables a Massively Parallel Fluidic Design for High-throughput and Multiplexed Cell Isolation.** *Advanced materials technologies*  
Ooi, C., Earhart, C. M., Hughes, C. E., Lee, J. R., Wong, D. J., Wilson, R. J., Rohatgi, R., Wang, S. X.  
2020; 5 (5)
- **Drive-Current-Free Switch With Internal Transduction in a Magneto Piezo-Electronic Transistor** *IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS*  
Xue, F., Guo, Y., Sato, N., Ouyang, Y., Han, Z., Wang, S. X., Hu, J., He, J.  
2020; 67 (4): 3257–66
- **Flow Homogenization Enables a Massively Parallel Fluidic Design for High-Throughput and Multiplexed Cell Isolation** *ADVANCED MATERIALS TECHNOLOGIES*  
Ooi, C., Earhart, C. M., Hughes, C. E., Lee, J., Wong, D. J., Wilson, R. J., Rohatgi, R., Wang, S. X.  
2020
- **Carbon-coated FeCo nanoparticles as sensitive magnetic-particle-imaging tracers with photothermal and magnetothermal properties.** *Nature biomedical engineering*  
Song, G. n., Kenney, M. n., Chen, Y. S., Zheng, X. n., Deng, Y. n., Chen, Z. n., Wang, S. X., Gambhir, S. S., Dai, H. n., Rao, J. n.  
2020
- **Spin-Orbit-Torque Material Exploration for Maximum Array-Level Read/Write Performance**  
Liao, Y., Kumar, P., Dc, M., Li, X., Zhang, D., Wang, J., Wang, S. X., Ralph, D. C., Naeemi, A., IEEE  
IEEE.2020
- **A mountable toilet system for personalized health monitoring via the analysis of excreta.** *Nature biomedical engineering*  
Park, S. M., Won, D. D., Lee, B. J., Escobedo, D. n., Esteva, A. n., Aalipour, A. n., Ge, T. J., Kim, J. H., Suh, S. n., Choi, E. H., Lozano, A. X., Yao, C. n., Bodapati, et al  
2020
- **Piezoelectric-Piezoresistive Coupling MEMS Sensors for Measurement of Electric Fields of Broad Bandwidth and Large Dynamic Range** *IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS*  
Xue, F., Hu, J., Guo, Y., Han, G., Ouyang, Y., Wang, S. X., He, J.

2020; 67 (1): 551–59

- **Publisher Correction: A mountable toilet system for personalized health monitoring via the analysis of excreta.** *Nature biomedical engineering*  
Park, S. M., Won, D. D., Lee, B. J., Escobedo, D. n., Esteva, A. n., Aalipour, A. n., Ge, T. J., Kim, J. H., Suh, S. n., Choi, E. H., Lozano, A. X., Yao, C. n., Bodapati, et al  
2020
- **Early multiplexed detection of cirrhosis by giant magnetoresistive biosensors with protein biomarkers.** *ACS sensors*  
Ng, E. n., Le, A. K., Nguyen, M. H., Wang, S. X.  
2020
- **Materials Requirements of High-Speed and Low-Power Spin-Orbit-Torque Magnetic Random-Access Memory**  
Li, X., Lin, S., Dc, M., Liao, Y., Yao, C., Naeemi, A., Tsai, W., Wang, S. X.  
IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.2020: 674–80
- **Method of inter-turn fault detection for next-generation smart transformers based on deep learning algorithm** *HIGH VOLTAGE*  
Duan, L., Hu, J., Zhao, G., Chen, K., Wang, S. X., He, J.  
2019; 4 (4): 282–91
- **Large voltage control of magnetic anisotropy in CoFeB/MgO/OX structures at room temperature** *APL MATERIALS*  
Xue, F., Sato, N., Bi, C., Hu, J., He, J., Wang, S. X.  
2019; 7 (10)
- **Efficient spin current generation in low-damping Mg(Al, Fe)(2)O-4 thin films** *APPLIED PHYSICS LETTERS*  
Riddiford, L. J., Wisser, J. J., Emori, S., Li, P., Roy, D., Cogulu, E., van't Erve, O., Deng, Y., Wang, S. X., Jonker, B. T., Kent, A. D., Suzuki, Y.  
2019; 115 (12)
- **Current sensors based on GMR effect for smart grid applications** *SENSORS AND ACTUATORS A-PHYSICAL*  
Ouyang, Y., Wang, Z., Zhao, G., Hu, J., Ji, S., He, P., Wang, S. X.  
2019; 294: 8–16
- **Identification of Partial Discharge Defects Based on Deep Learning Method** *IEEE TRANSACTIONS ON POWER DELIVERY*  
Duan, L., Hu, J., Zhao, G., Chen, K., He, J., Wang, S. X.  
2019; 34 (4): 1557–68
- **Overhead Transmission Line Parameter Reconstruction for UAV Inspection Based on Tunneling Magnetoresistive Sensors and Inverse Models** *IEEE TRANSACTIONS ON POWER DELIVERY*  
Wu, Y., Zhao, G., Hu, J., Ouyang, Y., Wang, S. X., He, J., Gao, F., Wang, S.  
2019; 34 (3): 819–27
- **Quantification of cDNA on GMR biosensor array towards point-of-care gene expression analysis** *BIOSENSORS & BIOELECTRONICS*  
Ravi, N., Rizzi, G., Chang, S. E., Cheung, P., Utz, P. J., Wang, S. X.  
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- **Magnetoresistive Sensor Development Roadmap (Non-Recording Applications)** *IEEE TRANSACTIONS ON MAGNETICS*  
Zheng, C., Zhu, K., de Freitas, S., Chang, J., Davies, J. E., Eames, P., Freitas, P. P., Kazakova, O., Kim, C., Leung, C., Liou, S., Ognev, A., Piramanayagam, et al  
2019; 55 (4)
- **Self-healing of electrical damage in polymers using superparamagnetic nanoparticles** *NATURE NANOTECHNOLOGY*  
Yang, Y., He, J., Li, Q., Gao, L., Hu, J., Zeng, R., Qin, J., Wang, S. X., Wang, Q.  
2019; 14 (2): 151–+
- **Magneto-nanosensor smartphone platform for the detection of HIV and leukocytosis at point-of-care** *NANOMEDICINE-NANOTECHNOLOGY BIOLOGY AND MEDICINE*  
Ng, E., Yao, C., Shultz, T. O., Ross-Howe, S., Wang, S. X.  
2019; 16: 10–19
- **Highly sensitive detection of DNA hypermethylation in melanoma cancer cells** *BIOSENSORS & BIOELECTRONICS*  
Nesvet, J., Rizzi, G., Wang, S. X.



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- **An electrodynamic energy harvester with a 3D printed magnet and optimized topology** *APPLIED PHYSICS LETTERS*  
 Wang, Z., Huber, C., Hu, J., He, J., Suess, D., Wang, S. X.  
 2019; 114 (1)
- **GMR Spin-Valve Biosensors** *SPINTRONICS HANDBOOK: SPIN TRANSPORT AND MAGNETISM: NANOSCALE SPINTRONICS AND APPLICATIONS, VOL 3, 2ND EDITION*  
 Lee, J., Gaster, R. S., Hall, D. A., Wang, S. X., Tsymbal, E. Y., Zutic  
 2019: 471–97
- **Interfacial engineering of SOT-MRAM to modulate atomic diffusion and enable PMA stability > 400 degrees C**  
 Bi, C., Lin, S., Li, X., Simsek, T., Song, M., Tsai, W., Wang, S. X., IEEE  
 IEEE.2019
- **An Automated, Quantitative, and Multiplexed Assay Suitable for Point-of-Care Hepatitis B Virus Diagnostics.** *Scientific reports*  
 Gani, A. W., Wei, W. n., Shi, R. Z., Ng, E. n., Nguyen, M. n., Chua, M. S., So, S. n., Wang, S. X.  
 2019; 9 (1): 15615
- **Improved detection of prostate cancer using a magneto-nanosensor assay for serum circulating autoantibodies.** *PloS one*  
 Xu, L., Lee, J., Hao, S., Ling, X. B., Brooks, J. D., Wang, S. X., Gambhir, S. S.  
 2019; 14 (8): e0221051
- **In Vitro Cancer Diagnostics** *NANOTHERANOSTICS FOR CANCER APPLICATIONS*  
 Lee, J., Ooi, C., Wang, S. X., Rai, P., Morris, S. A.  
 2019; 5: 109–32
- **Self-healing of electrical damage in polymers using superparamagnetic nanoparticles.** *Nature nanotechnology*  
 Yang, Y., He, J., Li, Q., Gao, L., Hu, J., Zeng, R., Qin, J., Wang, S. X., Wang, Q.  
 2018
- **Magneto-nanosensor Smartphone Platform for the Detection of HIV and Leukocytosis at Point-of-Care.** *Nanomedicine : nanotechnology, biology, and medicine*  
 Ng, E., Yao, C., Shultz, T. O., Ross-Howe, S., Wang, S. X.  
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