

# Stanford

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## 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

### CONTACT INFORMATION

- **Administrator**

Nuvia Pacheco - Administrative Associate

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**Tel** 650 723 0197

### Bio

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#### BIO

Prof. Wang 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).

Dr. Wang cofounded three high-tech startups in Silicon Valley, including MagArray, Inc. and Flux Biosciences, Inc. 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 2019, Flux Biosciences launched a human trial to offer at-home testing of fertility based on hormones and magneto-nanosensors. Through his participation in the Center for Cancer Nanotechnology Excellence (as co-PI of the CCNE) and the Joint University Microelectronics Program (JUMP), he is actively engaged in the transformative research of healthcare and is developing emerging memories for energy efficient computing.

#### 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**

- 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 (SCPKU) (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 Magnetics 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).

Dr. Wang cofounded three high-tech startups in Silicon Valley, including MagArray, Inc. and Flux Biosciences, Inc. 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 2019, Flux Biosciences launched a human trial to offer at-home testing of fertility based on hormones and magneto-nanosensors. Through his participation in the Center for Cancer Nanotechnology Excellence (as co-PI of the CCNE) and the Joint University Microelectronics Program (JUMP), he is actively engaged in the transformative research of healthcare and is developing emerging memories for energy efficient computing.

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

#### 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)

#### 2020-21

- 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)

#### 2019-20

- Biochips and Medical Imaging: EE 225, MATSCI 225 (Win)
- New Methods in Thin Film Synthesis: MATSCI 312 (Aut)

## STANFORD ADVISEES

### Doctoral Dissertation Reader (AC)

Ziad Ali, Prima Dewi Sinawang, Ian Thompson

### Postdoctoral Faculty Sponsor

Fen Xue, Yu Zhang

### Doctoral Dissertation Advisor (AC)

Katie Antilla, Christopher Choi, William Hwang, Sofie de Olazarra

### Doctoral Dissertation Co-Advisor (AC)

Kenneth Brinson

**Master's Program Advisor**

Uzma Shaikh, Shirong Wu

**Doctoral (Program)**

Myungheon(Young) Chin, Vivek Lam, Aadith Moorthy, Itamar Terem, Kelly Woo, Joshua Yang

**Postdoctoral Research Mentor**

Fen Xue

**GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS**

- Bioengineering (Phd Program)

**Publications**

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**PUBLICATIONS**

- **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-Wurtemberg, 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.  
2022
- **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
- **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., De, 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.  
2019; 130: 338–43
- **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.  
2019; 124: 136–42

- **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.  
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- **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.  
2018
- **Magneto-resistive biosensors with on-chip pulsed excitation and magnetic correlated double sampling** *SCIENTIFIC REPORTS*  
Kim, K., Hall, D. A., Yao, C., Lee, J., Ooi, C. C., Bechstein, D. B., Guo, Y., Wang, S. X.  
2018; 8
- **Magneto-resistive biosensors with on-chip pulsed excitation and magnetic correlated double sampling.** *Scientific reports*  
Kim, K., Hall, D. A., Yao, C., Lee, J., Ooi, C. C., Bechstein, D. J., Guo, Y., Wang, S. X.  
2018; 8 (1): 16493
- **Highly sensitive detection of DNA hypermethylation in melanoma cancer cells.** *Biosensors & bioelectronics*  
Nesvet, J., Rizzi, G., Wang, S. X.  
2018; 124-125: 136–42
- **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.  
2018
- **An intravascular magnetic wire for the high-throughput retrieval of circulating tumour cells in vivo** *NATURE BIOMEDICAL ENGINEERING*  
Vermesh, O., Aalipour, A., Ge, T., Saenz, Y., Guo, Y., Alam, I. S., Park, S., Adelson, C. N., Mitsutake, Y., Vilches-Moure, J., Godoy, E., Bachmann, M. H., Ooi, et al  
2018; 2 (9): 696–705
- **Two-terminal spin-orbit torque magneto-resistive random access memory** *NATURE ELECTRONICS*  
Sato, N., Xue, F., White, R. M., Bi, C., Wang, S. X.  
2018; 1 (9): 508–11
- **An intravascular magnetic wire for the high-throughput retrieval of circulating tumour cells in vivo.** *Nature biomedical engineering*

- Vermesh, O., Aalipour, A., Ge, T. J., Saenz, Y., Guo, Y., Alam, I. S., Park, S. M., Adelson, C. N., Mitsutake, Y., Vilches-Moure, J., Godoy, E., Bachmann, M. H., Ooi, et al  
2018; 2 (9): 696-705
- **A blood biomarker for monitoring response to anti-EGFR therapy.** *Cancer biomarkers : section A of Disease markers*  
Hughes, N. P., Xu, L., Nielsen, C. H., Chang, E., Hori, S. S., Natarajan, A., Lee, S., Kjar, A., Kani, K., Wang, S. X., Mallick, P., Gambhir, S. S.  
2018
  - **Learning-based Data Analytics: Moving Towards Transparent Power Grids** *CSEE JOURNAL OF POWER AND ENERGY SYSTEMS*  
Chen, K., He, Z., Wang, S. X., Hu, J., Li, L., He, J.  
2018; 4 (1): 67-82
  - **Longitudinal Multiplexed Measurement of Quantitative Proteomic Signatures in Mouse Lymphoma Models Using Magneto-Nanosensors.** *Theranostics*  
Lee, J. R., Appelmann, I. n., Miething, C. n., Shultz, T. O., Ruderman, D. n., Kim, D. n., Mallick, P. n., Lowe, S. W., Wang, S. X.  
2018; 8 (5): 1389-98
  - **An intravascular magnetic wire for the high-throughput retrieval of circulating tumour cells in vivo.** *Nature biomedical engineering*  
Vermesh, O., Aalipour, A., Ge, T. J., Saenz, Y., Guo, Y., Alam, I. S., Park, S., Adelson, C. N., Mitsutake, Y., Vilches-Moure, J., Godoy, E., Bachmann, M., Ooi, et al  
2018; 2: 696-705
  - **Marrying Nanomagnetism with RNA Sequencing of Single Cancer Cells**  
Wang, S. X., Ooi, C., IEEE  
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  - **Integrated Thin-Film Magnetolectric Waveguide with Tun-able Resonance Frequency**  
El-Ghazaly, A., Evans, J., Sato, N., Montross, N., White, R. M., Wang, S. X., IEEE  
IEEE.2018
  - **Thin-Film Magnetic Inductors for Gigahertz Integrated Applications**  
El-Ghazaly, A., White, R. M., Wang, S. X., IEEE  
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  - **Validation of Plasma TIMP-1 to Identify Lung Cancer in Smokers**  
Nair, V. S., Beggs, M., Yu, H., Carbonell, L., Wang, S. X., Vachani, A.  
AMER THORACIC SOC.2018
  - **A blood biomarker for monitoring response to anti-EGFR therapy** *CANCER BIOMARKERS*  
Hughes, N. P., Xu, L., Nielsen, C. H., Chang, E., Hori, S. S., Natarajan, A., Lee, S., Kjaer, A., Kani, K., Wang, S. X., Mallick, P., Gambhir, S.  
2018; 22 (2): 333-44
  - **Gigahertz-Band Integrated Magnetic Inductors** *IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES*  
El-Ghazaly, A., White, R. M., Wang, S. X.  
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  - **Current Reconstruction of Bundle Conductors Based on Tunneling Magnetoresistive Sensors**  
Zhao, G., Hu, J., Zhao, S., Wang, Z., Wang, S. X., He, J.  
IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC.2017
  - **Simultaneous Profiling of DNA Mutation and Methylation by Melting Analysis Using Magnetoresistive Biosensor Array.** *ACS nano*  
Rizzi, G., Lee, J. R., Dahl, C., Guldborg, P., Dufva, M., Wang, S. X., Hansen, M. F.  
2017; 11 (9): 8864-8870
  - **Novel Method for Magnetic Field Vector Measurement Based on Dual-Axial Tunneling Magnetoresistive Sensors** *IEEE TRANSACTIONS ON MAGNETICS*  
Zhao, G., Hu, J., Ouyang, Y., Chang, W., Wang, Z., Wang, S. X., He, J., Bi, J.  
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  - **Denaturation strategies for detection of double stranded PCR products on GMR magnetic biosensor array** *BIOSENSORS & BIOELECTRONICS*  
Rizzi, G., Lee, J., Guldborg, P., Dufva, M., Wang, S. X., Hansen, M. F.  
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- **Closed-loop model: An optimization of integrated thin-film magnetic devices** *JOURNAL OF MAGNETISM AND MAGNETIC MATERIALS*  
El-Ghazaly, A., Sato, N., White, R. M., Wang, S. X.  
2017; 432: 218-223
- **Exchange-Biased Anisotropic Magneto-resistive Field Sensor** *IEEE SENSORS JOURNAL*  
Guo, Y., Ouyang, Y., Sato, N., Ooi, C. C., Wang, S. X.  
2017; 17 (11): 3309-3315
- **Magnetic Nanoparticle-Based Upregulation of B-Cell Lymphoma 2 Enhances Bone Regeneration.** *Stem cells translational medicine*  
Brett, E., Zielins, E. R., Luan, A., Ooi, C. C., Shailendra, S., Atashroo, D., Menon, S., Blackshear, C., Flacco, J., Quarto, N., Wang, S. X., Longaker, M. T., Wan, et al  
2017; 6 (1): 151-160
- **Multigene Profiling of Single Circulating Tumor Cells** *Molecular & Cellular Oncology*  
Park, S., Wong, D., Ooi, C., Nesvet, J., Nair, V. S., Wang, S. X., Gambhir, S. S.  
2017; 4 (2): e1289295
- **Capture and Genetic Analysis of Circulating Tumor Cells Using a Magnetic Separation Device (Magnetic Sifter)** *CIRCULATING TUMOR CELLS: METHODS AND PROTOCOLS*  
Ooi, C., Park, S., Wong, D. J., Gambhir, S. S., Wang, S. X., Magbanua, M. J., Park, J. W.  
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