Junjia Ding

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Education

Ph. D. Department of Electrical & Computer Engineering
National University of Singapore, Singapore **Aug 2009 - Aug 2013**
Thesis Title: *Novel Magnonic Crystals and Devices: Fabrication, Static and Dynamic Behaviors*

M. Eng. Microelectronics and Solid State Electronics
Huazhong University of Science and Technology, China **Aug 2007 - Jul 2009**
Thesis Title: *Broadband Microwave Absorbing Material: Design and Fabrication*

B. Eng. Electronic Science and Technology
Huazhong University of Science and Technology, China **Sep 2003 - Jul 2007**
Thesis Title: *The Electromagnetic Properties of Conductive Fiber-foam Composite*

Work Experience

Postdoctoral Appointee
Magnetic Films Group, Materials Science Division
Cosmic Frontier Group, High Energy Physics Division **June 2014 - Present**
Argonne National Laboratory, USA

- Design, fabricate and characterize magnetic nanostructure for fundamental and applied physics investigation.
- Design, fabricate and characterize transition-edge sensor (TES) bolometers for Cosmic Microwave Background Observations with the South Pole Telescope.

Facility User
Stanford Synchrotron Radiation Laboratory **March 2015 - Present**
SLAC National Accelerator Laboratory, USA

- X-ray investigation of spin current diffusion into copper by microwave spin pumping

Research Engineer
Department of Electrical & Computer Engineering **Aug 2013 - May 2014**
National University of Singapore, Singapore

- Design, fabricate and characterize magnonic crystals consisting of various types of nanoscale magnetic structures.

Teaching Assistant of *MATLAB & LabVIEW for Electrical Engineers*
Department of Electrical & Computer Engineering **Jan 2010 - May 2013**
National University of Singapore, Singapore

Technical Skills

Fabrication: E-Beam Lithography, UV-Lithography, Laser Direct Write Lithography, Stepper (Photolithography), 3D Micrometer Printing, E-Beam Evaporation, Sputter Deposition, Reactive-ion Etching and Xenon Difluoride (XeF2) Etching.

- Fabricate nanoscale devices using multiple steps Lithography, deposition, lift-off and etching process.
- Fabricate array of devices with multi-layer alignments in wafer level using stepper.

Characterization: Scanning Electron Microscopy, Atomic and Magnetic Force Microscopy, Magneto-Optic Kerr Spectroscopy, Vibrating Sample Magnetometer, Vector Network Analyzer Microwave Measurement, Micro Focused Brillouin light scattering Microscopy, X-Ray Magnetic Circular Dichroism, Low-Temperature Measurement.

- Characterize the geometry of nanostructures using SEM and AFM.
- Probe the magnetic ground state of nanostructures using MFM.

- Measure the static response of nanostructures using MOKE and VSM.
- Investigate dynamic response of nanostructures using VNA-FMR and μ-BLS microscopy.

Simulation: Object-Oriented Micromagnetic Framework (OOMMF), LLG Micromagnetics Simulator, Mumax^3 (GPU accelerated), ANSYS HFSS software.

- Perform static and dynamic simulation for magnetic nano/microstructures using micromagnetic simulation packages.
- Perform microwave simulation using HFSS software.

Programming: Matlab, LabVIEW, Python, Swift

- Control equipments, analyze and visualize data using LabVIEW, Matlab and Python.
- iOS APP Development using Swift.

Awards

- 'Dynamic Control of Metastable Remanent States in Mesoscale Elliptical Elements' **Best Poster Award**, ***59th Annual Magnetism & Magnetic Materials Conference***, Honolulu, Hawaii, USA, 3 – 7 Novemeber 2014.
- **2012 Chinese Government Award for Outstanding Self-financed Students Abroad**, presented by **China Scholarship Council**.
- 'Realization of a Reprogrammable Magnetic Logic Based on a Nanoscale Reconfigurable Magnonic Crystal'. **Best Presentation Award**, ***5th IEEE Magnetics Society Summer School***, Nanotechnology Research Centre, SRM University, India, 22 – 27 July 2012.
- 'Static and Dynamic Properties of One-Dimensional Linear Chain of Nanomagnets' **Best Poster Award**, ***IEEE Magnetics Society Singapore Chapter Poster Competition for Students***, DSI, Singapore, 18 October 2010.

Conference Talks

- 'Fabrication and Performance Optimization of Large TES Bolometer Arrays for CMB Measurements with the SPT-3G Camera' Given at the ***50th IEEE Applied Superconductivity Conference***, Denver, CO, USA, 2016.
- 'Vortex Gyrotropic Motion in Patterned Ferromagnetic Dots' Given at the ***APS MARCH MEETING 2016***, Baltimore, MD, USA, 2016.
- 'Static and Dynamic Magnetic Properties of $Ni_{80}Fe_{20}$ Anti-Ring Nanostructures' Given at the ***58th Annual Conference on Magnetism & Magnetic Materials (MMM)***, Denver, CO, USA, 2013.
- 'Magnonic Crystals Based on Binary Ferromagnetic Nanostructure' Given at ***12th Joint MMM/ Intermag Conference***, Chicago, IL, USA, 2013.
- 'Dynamic Response of 1-D Magnonic Crystals Consisting of Alternating Width Nanowires' Given at the ***56th Annual Conference on Magnetism & Magnetic Materials (MMM)***, Scottsdale, AZ, USA, 2011.
- 'Angular Dependence Dynamic Properties of Permalloy Nanowires' Given at the ***IEEE International Magnetics Conference (INTERMAG)***, Taipei, 2011.

Professional Services

- Member of American Physical Society.
- Referee for Journal of Applied Physics, AIP Advances.
- Session chair of Annual Conference on Magnetism and Magnetic Materials

Publication List

Selected Publications:

1. J. Ding, P. A. R. Ade, Z. Ahmed, K. Arnold, J. E. Austermann, A. N. Bender *et al*. 'Optimization of Transition Edge Sensor Arrays for Cosmic Microwave Background Observations with the South Pole Telescope' ***IEEE Transactions on Applied Superconductivity***, **27**, 2100204 (2016).
2. J. Ding, S. Jain, P. N. Lapa, T. Khaire, S. Lendinez, W. Zhang, M. B. Jungfleisch, C. M. Posada, V. G. Yefremenko, J. E. Pearson, A. Hoffmann, V. Novosad, 'Spin Vortex Resonance in Non-planar Ferromagnetic Dots' ***Scientific Reports***, **6**, 25196 (2016).
3. J. Ding, S. Jain, P. N. Lapa, T. Khaire, S. Lendinez, C. M. Posada, W. Zhang, J. E. Pearson, A. Hoffmann, V. Novosad, 'Gyrotropic Frequency control in Ferromagnetic Dots using a Nanoscale Vortex Barrier' ***AIP Advances***, **6**, 056102 (2016).
4. S. Li*, W. Zhang*, J. Ding*, J. E. Pearson, V. Novosad, A. Hoffmann, 'Epitaxial Patterning of Nanometer-thick $Y_3Fe_5O_{12}$ Films with Low Magnetic Damping' ***Nanoscale,*** **8**, 388, (2016). *Contributed equally
5. J. Ding, S. Jain, J.E. Pearson, S. Lendinez, V. Khovaylo, V. Novosad, 'Dynamic Control of Metastable Remanent States in Mesoscale Magnetic Elements' ***Journal of Applied Physics,*** **117**, 17A707 (2015).
6. J. Ding, G. N Kakazei, X. M. Liu, K. Y. Guslienko, A. O. Adeyeye, 'Intensity Inversion of Vortex Gyrotropic Modes in Thick Ferromagnetic Nanodots' ***Applied Physics Letters***, **104**, 192405 (2014).
7. J. Ding, G. N Kakazei, X. M. Liu, K. Y. Guslienko, A. O. Adeyeye, 'Higher Order Vortex Gyrotropic Modes in Circular Ferromagnetic Nanodots' ***Scientific Reports***, **4**, 4796 (2014).
8. J. Ding, V. E. Demidov, M. G. Cottam, S. O. Demokritov, A. O. Adeyeye, 'Dynamic Behavior of $Ni_{80}Fe_{20}$ Nanowires with Controlled Defects' ***Applied Physics Letters***, **104**, 143105 (2014).
9. J. Ding, N. Singh, M. Kostylev and A. O. Adeyeye. 'Static and Dynamic Magnetic Properties of $Ni_{80}Fe_{20}$ Anti-ring Nanostructures' ***Physical Review B***, **88**, 014301 (2013).
10. J. Ding and A. O. Adeyeye. 'Binary Ferromagnetic Nanostructures: Fabrication, Static and Dynamic Properties' ***Advanced Functional Materials***, **23**, 1684 (2013).
11. J. Ding and A. O. Adeyeye. '$Ni_{80}Fe_{20}$/Ni Binary Nanomagnets for Logic Applications' ***Applied Physics Letters***, **100**, 073114 (2012).
12. J. Ding, D. Tripathy and A. O. Adeyeye. 'Dynamic Response of Antidot Nanostructures with Alternating Hole Diameters' ***Europhysics Letters***, **98**, 16004 (2012).
13. J. Ding, M. Kostylev and A. O. Adeyeye. 'Realization of a Mesoscopic Reprogrammable Magnetic Logic Based on a Nanoscale Reconfigurable Magnonic Crystal' ***Applied Physics Letters***, **100**, 073114 (2012).
14. J. Ding, M. Kostylev and A. O. Adeyeye. 'Broadband Ferromagnetic Resonance Spectroscopy of Permalloy Triangular Nanorings' ***Applied Physics Letters***, **100**, 062401 (2012).
15. J. Ding, M. Kostylev and A. O. Adeyeye. 'Magnetic Hysteresis of Dynamic Response of One-Dimensional Magnonic Crystals Consisting of Homogenous and Alternating Width Nanowires Observed with Broadband Ferromagnetic Resonance' ***Physical Review B***, **84**, 054425 (2011).
16. J. Ding, M. Kostylev and A. O. Adeyeye. 'Magnonic Crystal as a Medium with Tunable Disorder on a Periodical Lattice' ***Physical Review Letters***, **107**, 047205 (2011).
17. J. Ding, D. Tripathy and A. O. Adeyeye. 'Effect of Antidot Diameter on the Dynamic Response of Nanoscale Antidot Arrays' ***Journal of Applied Physics***, **109**, 07D304 (2011).
18. J. Ding, S. Jain and A. O. Adeyeye, 'Static and Dynamic Properties of One-Dimensional Linear Chain of Nanomagnets' ***Journal of Applied Physics***, **109**, 07D301 (2011).

Other Publications:

1. M. Sushruth, J. Ding, J. Duczynski, R. C. Woodward, R. A. Begley, H. Fangohr, R. O. Fuller, A. O. Adeyeye, M. Kostylev and P. J. Metaxas, 'Resonance-Based Detection of Magnetic

Nanoparticles and Microbeads Using Nanopatterned Ferromagnets' ***Physical Review Applied***, in press.

2. A. N. Bender, P. A. R. Ade, Z. Ahmed, K. Arnold, J. E. Austermann, A. N. Bender, L. E. Bleem, B. A. Benson, K. Byrum, J. E. Carlstrom, C. L. Chang, H. M. Cho, S. T. Ciocys, J. F. Cliche, T. M. Crawford, A. Cukierman, D. Czaplewski, J. Ding *et al*. 'Integrated performance of a frequency domain multiplexing readout in the SPT-3G receiver' ***Proceeding, SPIE,* Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy VIII**, 99141D (2016).
3. C. M. Posada, P. A. R. Ade, Z. Ahmed, K. Arnold, J. E. Austermann, A. N. Bender, L. E. Bleem, B. A. Benson, K. Byrum, J. E. Carlstrom, C. L. Chang, H. M. Cho, S. T. Ciocys, J. F. Cliche, T. M. Crawford, A. Cukierman, D. Czaplewski, J. Ding *et al*. 'Large arrays of dual-polarized multichroic TES detectors for CMB measurements with the SPT-3G receiver' ***Proceeding, SPIE,* Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy VIII**, 991417 (2016).
4. G. Gubbiotti, S. Tacchi, M. Madami, G. Carlotti, Z. Yang, J. Ding, A. O. Adeyeye and M. Kostylev, 'Collective Spin Excitations in Bicomponent Magnonic Crystals Consisting of Bilayer Permalloy/Fe Nanowires' ***Physical Review B***, 93, 184411 (2016).
5. P. N. Lapa, T. Khaire, J. Ding, J. E. Pearson, V. Novosad, A. Hoffmann and J. S. Jiang 'Spin Valve with Non-collinear Magnetization Configuration Imprinted by a Static Magnetic Field' ***AIP Advances***, 6, 056107 (2016).
6. M. B. Jungfleisch, W. Zhang, E. Iacocca, J. Sklenar, J. Ding, W. Jiang, S. Zhang, J. E. Pearson, V. Novosad, J. B. Ketterson, O. Heinonen and A. Hoffmann 'Dynamic Response of an Artificial Square Spin Ice' ***Physical Review B***, **93**, 100401 (2016).
7. M. B. Jungfleisch, W. Zhang, J. Sklenar, J. Ding, W. Jiang, H. Chang, F. Y. Fradin, J. E. Pearson, J. B. Ketterson, V. Novosad, M. Wu and A. Hoffmann, 'Large Spin-wave Bullet in a Ferrimagnetic Insulator Driven by Spin Hall Effect' ***Physical Review Letters***, **116**, 057601 (2016).
8. M. B. Jungfleisch, W. Zhang, J. Ding, W. Jiang, J. Sklenar, J. E. Pearson, J. B. Ketterson and A. Hoffmann, 'All-electrical Detection of Spin Dynamics in Magnetic Antidot Lattices by the Inverse Spin Hall Effect' ***Applied Physics Letters***, **108**, 052403 (2016).
9. G. N. Kakazei, X. M. Liu, J. Ding, V. O. Golub, O. Y. Salyuk, R. V. Verba, S. A. Bunyaev and A. O. Adeyeye, 'Large Four-fold Magnetic Anisotropy in Two-dimensional Modulated $Ni_{80}Fe_{20}$ Films' ***Applied Physics Letters***, **107**, 232402 (2015).
10. C. M. Posada, P. A. R. Ade, Z. Ahmed, K. Arnold, J. E. Austermann, A. N. Bender, L. E. Bleem, B. A. Benson, K. Byrum, J. E. Carlstrom, C. L. Chang, H. M. Cho, S. T. Ciocys, J. F. Cliche, T. M. Crawford, A. Cukierman, D. Czaplewski, J. Ding *et al*. 'Fabrication of Large Dual-polarized Multichroic TES Bolometer Arrays for CMB Measurements with the SPT-3G Camera' ***Superconductor Science and Technology***, **28**, 094002 (2015).
11. G. Gubbiotti, F. Montoncello, S. Tacchi, M. Madami, G. Carlotti, L. Giovannini, J. Ding and A. O. Adeyeye, 'Angle-resolved Spin Wave Band Diagrams of Square Antidot Lattices Studied by Brillouin Light Scattering' ***Applied Physics Letters***, **106**, 262406 (2015).
12. C. L. Chang, P. A. R. Ade, Z. Ahmed, S. W. Allen, K. Arnold, J. E. Austermann, A. N. Bender, L. E. Bleem, B. A. Benson, J. E. Carlstrom, H. M. Cho, S. T. Ciocys, J. F. Cliche, T. M. Crawford, A. Cukierman, J. Ding *et al.* 'Low Loss Superconducting Microstrip Development at Argonne National Lab' ***IEEE Transactions on Applied Superconductivity***, **25**, 2500105 (2015).
13. P. Metaxas, M. Sushruth, R. Begley, J. Ding, R. Woodward, I. Maksymov, M. Albert, W. Wang, H. Fangohr, A. O. Adeyeye and M. Kostylev, 'Sensing Magnetic Nanoparticles using Nano-confined Ferromagnetic Resonances in a Magnonic Crystal' ***Applied Physics Letters***, **106**, 232406 (2015).
14. KY Guslienko, GN Kakazei, J. Ding, X Liu and AO Adeyeye, 'Giant Moving Vortex Mass in Thick Magnetic Nanodots' ***Scientific Reports***, **5**, 13881 (2015).

15. X. Zhou, J. Ding, M. Kostylev and A. O. Adeyeye, 'Spin Wave Spectra in Perpendicularly Magnetized Permalloy Rings' ***Applied Physics Letters***, **106**, 112403 (2015).
16. X. M. Liu, J. Ding, and A. O. Adeyeye, 'Exchange bias effect in $Ni_{80}Fe_{20}$/CoO bi-component nanowires' ***Europhysics Letters***, **108**, 17003 (2014).
17. X. M. Liu, H. T. Nguyen, J. Ding, M. G. Cottam and A. O. Adeyeye, 'Interlayer Coupling in $Ni_{80}Fe_{20}$/Ru/$Ni_{80}Fe_{20}$ Multilayer Films: Ferromagnetic Resonance Experiments and Theory' ***Physical Review B***, **90**, 064428 (2014).
18. X. M. Liu, J. Ding, N. Singh, G. Shimon and A. O. Adeyeye, 'Magnetization Dynamics of Coupled $Ni_{80}Fe_{20}$ Dots: Effects of Configurational Anisotropy and Dipolar Coupling' ***Applied Physics Letters***, **105**, 052413 (2014).
19. G. Gubbiotti, P. Malago, S. Fin, S. Tacchi, L. Giovannini, D. Bisero, M. Madami, G. Carlotti, J. Ding, A. O. Adeyeye and R. Zivieri, 'Magnetic Normal Modes of Bicomponent Permalloy/ Cobalt Structures in the Parallel and Antiparallel Ground State' ***Physical Review B***, **90**, 024419 (2014).
20. M. Kostylev, J. Ding, E. Ivanov, S. Samarin and A. O. Adeyeye, 'Microwave Magnetic Dynamics in Highly Conducting Magnetic Nanostructures' ***Journal of Applied Physics***, **115**, 173903 (2014).
21. G. N. Kakazei, X. M. Liu, J. Ding and A. O. Adeyeye, '$Ni_{80}Fe_{20}$ Film with Periodically Modulated Thickness as a Reconfigurable One-dimensional Magnonic Crystal' ***Applied Physics Letters***, **104**, 042403 (2014).
22. G. Gubbiotti, M. Kostylev, S. Tacchi, M. Madami, G. Carlotti, J. Ding, A. O. Adeyeye, F. Zighem, A. A. Stashkevich, E. Ivanov and S. Samarin, 'Collective spin waves on a nanowire array with step-modulated thickness' ***Journal of Physics D: Applied Physics***, **47**, 105003 (2014).
23. C. S. Chang, M. Kostylev, E. Ivanov, J. Ding and A. O. Adeyeye, 'The Phase Accumulation and Antenna Near Field of Microscopic Propagating Spin Wave Devices' ***Applied Physics Letters***, **104**, 032408 (2014).
24. S. Saha, S. Barman, J. Ding, A. O. Adeyeye and A. Barman, 'Tunable Magnetic Anisotropy in Two-dimensional Arrays of $Ni_{80}Fe_{20}$ Elements' ***Applied Physics Letters***, **102**, 242409 (2013).
25. X. M. Liu, J. Ding, G. Kakazei, A. O. Adeyeye. 'Magnonic Crystals Composed of $Ni_{80}Fe_{20}$ Film on Top of $Ni_{80}Fe_{20}$ Two-dimensional Dot Array' ***Applied Physics Letters***, **103**, 062401 (2013).
26. M. Madami, S. Tacchi, G. Gubbiotti, G. Carlotti, J. Ding, A. O. Adeyeye, J. W. Klos, M. Krawczyk. 'Spin Wave Dispersion in Permalloy Antidot Array With Alternating Holes Diameter' ***IEEE Transactions on Magnetics***, **19**, 3093 (2013).
27. M. Kostylev, S. Zhong, J. Ding, and A. O. Adeyeye. 'Resonance Properties of Bi-component Arrays of Magnetic Dots Magnetized Perpendicular to Their Planes' ***Journal of Applied Physics***, **114**, 113910 (2013).
28. X. M. Liu, J. Ding, N. Singh, M. Kostylev, A. O. Adeyeye. 'Magnetoresistance Behavior of Bi-component Antidot Nanostructures' ***Europhysics Letters***, **103**, 67002 (2013).
29. S. Saha, S. Barman, J. Ding, A. O. Adeyeye and A. Barman, 'Time-domain Study of Spin-wave Dynamics in Two-dimensional Arrays of Bi-component Magnetic Structures' ***Applied Physics Letters***, **102**, 242409 (2013).
30. D. Cimpoesu, J. Ding, L. Stoleriu, A. O. Adeyeye, A. Stancu and L. Spinu. 'Angular Resonant Absorption Curves in Magnetic Nanowire Arrays' ***Applied Physics Letters***, **102**, 232401 (2013).
31. K. L. Livesey, J. Ding, N. R. Anderson, R. E. Camley, A. O. Adeyeye, M. P. Kostylev, and S. Samarin. 'Resonant Frequencies of a Binary Magnetic Nanowire' ***Physical Review B***, **87**, 064424 (2013).
32. X. M. Liu, J. Ding and A. O. Adeyeye. 'Magnetization Dynamics and Reversal Mechanism of Fe Filled $Ni_{80}Fe_{20}$ Antidot Nanostructures' ***Applied Physics Letters***, **100**, 242411 (2012).