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Education

Ph.D. in Physics (May 2006)

Department of Physics and Astronomy, Johns Hopkins University

M. A. in Physics (May 2004)

Department of Physics and Astronomy, Johns Hopkins University

M. S. in Microelectronics and Solid State Electronics (June 2000)

Department of Physics, Nanjing University, China

B. S. in Physics (July 1997)

Department of Intensive Instructions for Talented Undergraduates, Nanjing University, China

Research Interests

- Nanostructured materials fabrication, characterization and application
- Imaging of nanomagnetic materials by time-resolved photoemission electron microscope (TR-PEEM), magnetic force microscope (MFM), and magneto-optical microscope
- Nanocrystalline materials with ultrahigh strength
- Magnetic thin films and magnetic recording
- Ferromagnetic semiconductors and spintronics

Research Accomplishments

33 papers published in peer-reviewed journals.

The two most cited papers have been cited for **301** and **107** times since 2003.

17 invited talks or presentations on international conferences

Served as the referee for journals such as Applied Physics Letters, Journal of Applied Physics, and Applied Surface Science.

Professional Affiliation

American Physical Society
Materials Research Society

Honors and Awards

Bryn Mawr College start-up grant underwritten by the K/G Fund for Faculty Research

APS Professional Skills Development Workshop Travel Grant (2009)

NSF-funded Women in Science Workshop Travel Grant (2005)

APS Opportunities in Biology Conference Travel Grant (2004)

Rowland Prize for Innovation and Excellence in Teaching (2001)

Motorola Fellowship for Excellence in Research (1999)

Guanghua Scholarship for Excellence in Research (1999, 1998)

Chien-Shiung Wu Scholarship for Excellence in Undergraduate Physics Research (1995)

Nanjing University Academic Excellence Scholarship (1996, 1995, 1994, 1993)

Research Experience

July, 2009-present: Assistant Professor

Physics Department, Bryn Mawr College

- Nanostructured materials fabrication, characterization and application
- Imaging of nanomagnetic materials by time-resolved photoemission electron microscope (TR-PEEM), magnetic force microscope (MFM), and magneto-optical microscope
- Magnetic thin films and magnetic recording

May, 2006-July 2009: Postdoctoral Appointee

Advance Photon Source, Argonne National Lab

- Time resolved imaging using synchrotron x-ray photoemission electron microscopy
- Nanostructured magnetic materials studied by x-ray magnetic circular dichroism
- Fabrication of nanostructured magnetic materials via ebeam and optical lithography

2001-May, 2006: Research Assistant

Nanostructured Materials Lab, Department of Physics and Astronomy, Johns Hopkins University

- Magnetization reversal and magnetoresistance in materials with perpendicular anisotropy
- AFM/MFM and MOKE imaging of magnetic materials
- Magnetic properties of epitaxial semiconductor thin films
- Magnetic core loss in ultrahigh strength soft magnetic alloys
- Electrodeposition of CoPt alloyed thin films
- Self-assembly and electrodeposition of 3D nano-network with potential Bio-application

1995-2000 Research Assistant

Hetrostructured Semiconductor Lab, Department of Physics, Nanjing University, China

- Photoluminescence of thermally oxidized SiGeC alloys
- Fabrication and characterization of SiGeC thin films by Chemical Vapor Deposition
- Si_{1-x}Ge_x/Si Resonant Tunneling Structures and Staircase band-gap SiGe/Si photodetectors

Teaching Experience

Instructor

Bryn Mawr College

- Introductory Classical Mechanics (Spring, 2010)
- Modern Physics Laboratory (Spring, 2010)
- Electromagnetism (Fall, 2009)
- Advance Classical Mechanics (Fall, 2009)

Johns Hopkins University

- Nanostructured Magnetic Materials (Winter 2006)

Teaching Assistant

Johns Hopkins University

- Lab of Advanced Instrumentation (Spring 2002, Fall 2001)
- General Physics for Science Majors (Spring 2001)
- General Physics Lab II (Spring 2001)
- General Physics Lab I (Fall 2000)

Nanjing University, China

- General Physics in English for Talented Undergraduates (1996-1999)

Publications

1. **X. M. Cheng**, K. S. Buchanan, R. Divan, K.Y. Guslienko and D. J. Keavney
"Nonlinear vortex dynamics and transient domains in ferromagnetic disks "

- Phys. Rev. B, **79**, 172411 (2009).
- 2.D. J. Keavney, **X. M. Cheng**, and K. S. Buchanan
"Polarity reversal of a magnetic vortex core by a unipolar, nonresonant in-plane pulsed magnetic field"
Applied Physics Letters **94**, 172506 (2009).
 - 3.D. S. Gianola, C. Eberl, **X. M. Cheng**, and K. J. Hemker
"Stress-driven surface topography evolution in nanocrystalline Al thin films"
Advanced Materials, **20**, 303 (2008).
 - 4.Y. L. Iunin, Y. P. Kabanov, V. I. Nikitenko, **X. M. Cheng**, C. L. Chien, A. J. Shapiro, and R. D. Shull
"Magnetic field dependence of asymmetry in the magnetization reversal of ultrathin Co films and Co/Pt multilayers with perpendicular anisotropy "
Journal of magnetism and magnetic materials, **320**, 2044 (2008).
 - 5.Y. L. Iunin, Y. P. Kabanov, V. I. Nikitenko, X. M. Cheng, A. J. Shapiro, C. L. Chien, and R. D. Shull, "On the nature of asymmetry of nucleation centers in ultrathin Co films and Co/Pt multilayers," Functional Materials **15**, 51 (2008).
 - 6.D. S. Gianola, B. G. Mendis, **X. M. Cheng**, and K. J. Hemker
"Grain-size stabilization by impurities and effect on stress-coupled grain growth in nanocrystalline Al thin films"
Mater. Sci. Eng. A , **483**, 637 (2008).
 - 7.V. Rose, **X. M. Cheng**, D. J. Keavney, J. W. Freeland, K. S. Buchanan, B. Ilic, and V. Metlushko
"The breakdown of the fingerprinting of vortices by hysteresis loops in circular multilayer ring arrays"
Applied Physics Letters (**cover**), **91**, 132501 (2007).
 - 8.Y. L. Iunin, Y. P. Kabanov, V. I. Nikitenko, **X. M. Cheng**, D. Clarke, O. A. Tretiakov, O. Tchernyshyov, A. J. Shapiro, R. D. Shull, and C. L. Chien
"Asymmetric Domain Nucleation and Unusual Magnetization Reversal in Ultrathin Co Films with Perpendicular Anisotropy"
Physical Review Letters, **98**, 117204 (2007).
 - 9.Z. Adamus, Marta Z. Cieplak, A. Abal'oshev, M. Konczkowski, **X. M. Cheng**, L.Y. Zhu and C. L. Chien
"Flux penetration in a ferromagnetic/superconducting bilayer "
Acta Physica Polonica A, **111**, 95 (2007).
 10. **X. M. Cheng**, V.I. Nikitenko, A.J. Shapiro, R.D. Shull, and C. L. Chien,
"Unusual magnetic reversal in [Co/Pt]₄ multilayers with perpendicular anisotropy"
Journal of Applied Physics, **99**, 08c905 (2006).
 11. L. Y. Zhu, **X. M. Cheng**, and C. L. Chien
"Magnetic properties of 1D quasiperiodic Co/Pt multilayers"
Journal of Applied Physics, **99**, 08c902 (2006).
 12. Z. Adamus, Marta Z. Cieplak, A. Abal'oshev, M. Berkowski, M. Konczkowski, **X. M. Cheng**, L.Y. Zhu and C. L. Chien
" Vortex pinning in ferromagnet/superconductor bilayers—the dependence on the ferromagnetic layer and temperature "
Acta Physica Polonica A, **109**, 451 (2006).
 13. **X. M. Cheng**, S. Urazhdin, O. Tchernyshyo, C. L. Chien, V.I. Nikitenko, A.J. Shapiro and R.D. Shull
"Antisymmetric magnetoresistance in magnetic multilayers with perpendicular anisotropy"
Physical Review Letters, **94**, 017203 (2005).
 14. Marta Z. Cieplak, **X. M. Cheng**, C. L. Chien, and Hai Sang
"Origin of pinning enhancement in a ferromagnet-superconductor bilayer"
Journal of Applied Physics, **97**, 026105 (2005).
 15. Tom S. Eagleton, Jeremy Mallet, **X.M. Cheng**, Judy Wang, Chia-Ling Chien, and Peter C. Searson
"Electrodeposition of Co_xPt_{1-x} Thin Films"
Journal of The Electrochemical Society, **152**, C27-C31 (2005).
 16. Marta Z. Cieplak, Z. Adamus, A. Abal'oshev, I. Abal'osheva, M. Berkowski, **X. M. Cheng**, H.

- Sang, and C. L. Chien
 "The enhancement of vortex pinning in a ferromagnet/superconductor bilayers"
 Phys. Stat. Sol.(c), **2**, 1650 (2005).
17. Marta Z. Cieplak, Z. Adamus, M. Konczykowski, **X. M. Cheng**, A. Byczuk, A. Abal'oshev, H. Sang, and C. L. Chien
 " Superconducting pinning by magnetic domains in a ferromagnet-superconductor bilayer "
 Acta Physica Polonica A, **106**, 693 (2004).
18. **X. M. Cheng** and C. L. Chien
 "Magnetic properties of Epitaxial Mn doped ZnO thin films"
 Journal of Applied Physics, **93**, 7876 (2003).
19. **X. M. Cheng**, X. K. Zhang, D. Z. Zhang, S. H. Lee, A. Duckham, T. P. Weihs, R. C. Cammarata, John. Q. Xiao and C. L. Chien
 "Magnetic core loss of ultrahigh strength FeCo alloys"
 Journal of Applied Physics, **93**, 7121(2003).
20. Mingwei Chen, En Ma, Kevin J Hemker, Hongwei Sheng, Yiming Wang and **X. M. Cheng**
 "Deformation Twinning in Nanocrystalline Aluminum"
 Science, **300**,1275 (2003).
21. Liu Xiabing; Zang Lan; Zhu Shunming; **X. M. Cheng**; Han Ping; Luo Zhiyun; Zheng Youdou,
 "Effects of C on the growth of $\text{Si}_{1-x-y}\text{Ge}_x\text{C}_y$ alloys on Si(100) substrates"
 High Technology Letters, **11**, No.12, 84 (2001).
22. **X. M. Cheng**, Youdou Zheng, Ping Han, Xiabing Liu, Lan Zang,et al.
 "Studies on Thermal Annealing Behavior of $\text{Si}_{1-x-y}\text{Ge}_x\text{C}_y$ Heterostructure with Rich Ge and High C Content on Si (100) Substrate"
 High Technology Letters, **10**, 32 (2000).
23. **X. M. Cheng**, Y. D. Zheng, X.B. Liu, L. Zang, S. M. Zhu, and P. Han
 "Room-Temperature Photoluminescence of Thermally Oxidized $\text{Si}_{1-x-y}\text{Ge}_x\text{C}_y$ Thin Films on Si (100) Substrates"
 Chinese Journal of Semiconductors, **21**, 677 (2000).
24. Han Ping, **X. M. Cheng**, Masao Sakuraba, Young-Cheon Jeong, Takashi Maturra and Junichi Murata
 "The Effect of Si/Si_{1-y}C_y/Si Barriers on the Characteristics of $\text{Si}_{1-x}\text{Ge}_x/\text{Si}$ Resonant Tunneling Structures"
 Chinese Phys. Lett., **17 (11)**, 844-846 (2000).
25. Z. Y. Lo, R. L. Jiang, Y.D. Zheng, L. Zang, Z. Z. Chen, S. M. Zhu, **X. M. Cheng**, X. B. Liu.
 "Staircase band gap $\text{Si}_{1-x}\text{Ge}_x/\text{Si}$ photodetectors"
 Applied Physics Letters **77**, 1548 (2000).
26. R. L. Jiang, Z. Y. Lo, W. M. Chen, L. Zang, S. M. Zhu, X. B. Liu, **X. M. Cheng**, Z. Z. Chen, P. Chen, P. Han and Y. D. Zheng.
 "Normal-incidence SiGe/Si photodetectors with different buffer layers"
 Journal of Vacuum Science & Technology **B18 (3)**, 1251 (2000).
27. Jiang Roulian, Lo Zhiyun, Chen Weiming, **X. M. Cheng**, Zheng Youdou, etc.
 "Silicon-based $\text{Ge}_{0.85}\text{Si}_{0.15}$ heterostructure photodetectors"
 Semiconductor Optoelectronics, **21(1)**, 27 (2000).
28. R.L.Jiang, Z.Y.Lo, **X. M. Cheng**, Y.D.Zheng, etc.
 " $\text{Si}_{1-x}\text{Ge}_x/\text{Si}$ near infrared detectors",
 Journal of Optoelectronics-laser, **11(1)**, 17 (2000).
29. X.B. Liu, L. Zang, S.M. Zhu, **X. M. Cheng**, P. Han, Z.Y. Luo, Y.D. Zheng
 "Influence of C on GE incorporation in the growth of GE-rich $\text{Ge}_{1-x-y}\text{Si}_x\text{C}_y$ alloys on Si (100)"
 Applied Physics A **70 (4)**, 465 (2000).
30. **X. M. Cheng**, Youdou Zheng et al.
 "Room temperature blue luminescence of thermally oxidized $\text{Si}_{1-x-y}\text{Ge}_x\text{C}_y$ thin films on Si (100) substrates"

Applied Physics Letters, **75** 3333 (1999).

31. N. Jiang, L. Zhang, R.L. Jiang, S.M. Zhu, P.Han, X.B. Liu, **X. M. Cheng**, *et.al.*,
"Influence of growth conditions on the incorporation of substitutional C in $\text{Si}_{1-x-y}\text{Ge}_x\text{C}_y$ alloy on Si by chemical vapor deposition using C_2H_4 ,"
Applied Physics A **68**, 457 (1999).
32. N. Jiang, L. Zhang, R.L. Jiang, S.M. Zhu, P.Han, X.B. Liu, **X. M. Cheng**, *et.al.*,
"Growth of $\text{Si}_{1-x-y}\text{Ge}_x\text{C}_y$ ternary alloy on Si by chemical vapor deposition,"
Chinese Journal of Semiconductors, **20**, 650 (1999).
33. L. Zhang, N. Jiang, R.L. Jiang, S.M. Zhu, X.B. Liu, **X. M. Cheng**, *et. al.*,
"The study of growth and the properties of C in SiGeC alloy on Si by rapid thermal chemical vapor deposition,"
IEEE, P. 796 (1998).

Presentations

1. **X. M. Cheng**, D. J. Keavney, D. J. Clarke, O. Tchernyshyov, M. Mahoney, and A. Melikyan
"Vortex dynamics in an equilateral triangular arrangement of three magnetic disks "
American Physical Society March Meeting, 2010, Portland, OR.
2. **X. M. Cheng**
"Spin dynamics in magnetic nanostructures" (Invited talk)
Condensed Matter Seminar, Feb. 18, 2010, University of Connecticut.
3. **X. M. Cheng**, D. J. Keavney, and K. S. Buchanan
"Polarity reversal of magnetic vortex core by in-plane non-resonant pulsed magnetic field "
American Physical Society March Meeting, 2009, Pittsburgh, PA.
4. **X. M. Cheng**
"Capturing spin dancing in magnetic nanostructures " (Invited talk)
Condensed Matter Seminar, Feb. 2009, Johns Hopkins University.
5. **X. M. Cheng**, D. J. Keavney, and K. S. Buchanan
"Polarity reversal of a magnetic vortex core by an in-plane pulsed magnetic field "
International Conference on Magnetism and Magnetic Materials (MMM) 08, Nov. 2008, Austin, TX.
6. **X. M. Cheng**, D. J. Keavney, K. S. Buchanan, and R. Divan,
"The influence of excitation fields on vortex core dynamics in micron-sized magnetic disks "
International Conference on Magnetism and Magnetic Materials (MMM) 07, Nov. 2007, Tampa, FL.
7. **X. M. Cheng**, V.I. Nikitenko, A.J. Shapiro, R.D. Shull, and C. L. Chien,
"Unusual magnetization reversal in $[\text{Co}/\text{Pt}]_4$ multilayers with perpendicular anisotropy"
8th International Conference on Nanostructured Materials, Aug. 2006, Bangalore, India.
8. **X. M. Cheng**, L.Y. Zhu, C.L. Chien, Marta Z. Cieplak, Z. Adamus, A. Abal'oshev, and M. Berkowski,
"Magnetic pinning in Nb and YBCO thin films by $[\text{Co}/\text{Pt}]_n$ multilayers with perpendicular magnetic anisotropy "
American Physical Society March Meeting, 2006, Baltimore, MD.
9. Marta Z. Cieplak, Z. Adamus, A. Abal'oshev, M. Berkowski, M. Konczykowski, **X.M. Cheng**, L.Y. Zhu and C.L. Chien
"Flux penetration in a ferromagnetic/superconducting bilayer utilizing perpendicular magnetic anisotropy "
American Physical Society March Meeting, 2006, Baltimore, MD.
10. **X. M. Cheng**, V.I. Nikitenko, A.J. Shapiro, R.D. Shull, and C. L. Chien,
"Unusual magnetic reversal in $[\text{Co}/\text{Pt}]_4$ multilayers with perpendicular anisotropy"
International Conference on Magnetism and Magnetic Materials (MMM) 05, Nov. 2005, San Jose, CA.

11. L.Y. Zhu, **X.M. Cheng** and C.L. Chien
"Magnetic and electrical transport properties of 1D quasiperiodic Co/Pt multilayers"
International Conference on Magnetism and Magnetic Materials (MMM) 05, Nov. 2005, San Jose, CA
12. **X. M. Cheng**, S. Urazhdin, O. Tchernyshyov, C. L. Chien, V.I. Nikitenko, A.J. Shapiro and R.D. Shull
"Antisymmetric magnetoresistance in magnetic multilayers with perpendicular anisotropy"
International Conference on Magnetism and Magnetic Materials (MMM) 04, Nov. 2004, Jacksonville, FL
13. **X. M. Cheng**, B. Q. Luan and C. L. Chien
"Probing magnetization reversal in Co/Pt multilayers with perpendicular anisotropy by magnetoresistance, Hall resistance and magnetic force microscopy "
9TH Joint INTERMAG - MMM Conference, Jan. 2004, Anaheim, CA
14. M.Z. Cieplak, **X. M. Cheng**, A. Byczuk, H. Sang, A. Wisniewski, M. Konczykowski and C. L. Chien
"Asymmetric vortex pinning in a ferromagnet-superconductor bilayer"
9TH Joint INTERMAG - MMM Conference, Jan. 2004, Anaheim, CA
15. **X. M. Cheng** and C. L. Chien
"Magnetic properties of Epitaxial Mn doped ZnO thin films"
International Conference on Magnetism and Magnetic Materials (MMM) 02, Nov. 2002, Tampa, FL
16. **X. M. Cheng**, X. K. Zhang, D. Z. Zhang, S. H. Lee, A. Duckham, T. P. Weihs, R. C. Cammarata, John. Q. Xiao and C. L. Chien
"Magnetic core loss of ultrahigh strength FeCo alloys"
International Conference on Magnetism and Magnetic Materials (MMM) 02, Nov. 2002, Tampa, FL
17. **X. M. Cheng**, Youdou Zheng, Lan Zang, Xiabing Liu, et al.
"Room temperature ultraviolet luminescence from 800⁰C thermally oxidized Si_{1-x-y}Ge_xC_y thin films on Si (100) substrates"
Materials Research Society 1999 Fall Meeting, Boston, MA.