

Curriculum Vitae

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Education/Training:

Institution and Location	Degree	Year(s)	Field of Study
Peking University, Beijing, P.R. China	Ph.D.	1995	Surface Science
Peking University, Beijing, P. R. China	B.S.	1989	Condensed Matter Physics

Research and Professional Experience:

R&D Staff Scientist (August 2005– Present)

Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, Oak Ridge, TN

Adjunct Associate Professor (October 2012– Present)

Department of Materials Science and Engineering, University of Tennessee

Professor (November 2000 – August 2005)

Physics Department, Peking University, Beijing, P. R. China

Visiting Professor (May 2004 – August 2005)

Max Planck Institute of Microstructure Physics, Halle, Germany

Visiting Scientist (Dec 2000 – Dec 2003)

Low-Dimensional Materials by Design Group, Condensed Matter Sciences Division, Oak Ridge National Laboratory, USA

Associate Professor (August 1997 – November 2000)

Physics Department, Peking University, Beijing, P. R. China.

Visiting Scientist (July 1998 – September 1999)

Sakurai Lab, Institute for Materials Research, Tohoku University, Japan.

Visiting Scientist (March 1997 – May 1997)

Department of Material Science, State University of New York, Stony Brook, USA.

Postdoctoral Fellow (July 1995 – July 1997)

Physics Department, Peking University, Beijing, P. R. China.

Professional Activities, Honors, Awards:

2008–present	Chair Elected, and Executive Committee, Magnetic Interface and Nanostructure Division, American Vacuum Society
2001–present	Member: Materials Research Society, American Vacuum Society, and American Physical Society
1999	Outstanding Doctoral Thesis Award, Education Ministry, P.R. China
1998	Award for Progress in Science and Technology (2nd grade), Education Ministry, P.R. China
1997	Hu Gangfu Physics Award, Chinese Association of Physics
1996	Award for Progress in Science and Technology (1st grade), Education Ministry, P.R. China
1995	Outstanding Doctoral Thesis Award, Chinese Vacuum Society

Graduate and Postdoctoral Advisors:

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Thesis Advisor and Postgraduate-Scholar Sponsor:

Graduate Advisees: X. W. Tu (Peking University), Lu Chi (Peking University), Lei Zhang (Peking University), Kenji Fuchigami (University of Tennessee) (with Jian Shen), Min Gao (Institute of Physics, Chinese Academy of Sciences), Jieyu Yi (University of Tennessee, with David Mandrus), Siwei Tang (University of Tennessee, with David Mandrus).

Postdoctoral Scholars: Lan Gao, Deyong Wang, Lifeng Yin, Guixin Cao, Qiang Zou.

Collaborators:

T. Sakurai (Tohoku University, Japan), Heinrich Rohrer (visiting professor of Tohoku University), W.S. Yang (Peking University, China), J. Kirschner (Max-Planck-Institut, Germany), Hans-Peter Oepen (University of Hamburg, Germany), J.W.M. Frenken (Leiden University, Netherlands), M. T. Lin (Taiwan National University), H. J. Gao (IOP, China), M. Wang (Nanjing University, China), Qikun Xue (Tsinghua University), J.F. Jia (Shanghai Jiaotong University), Z. Zhang (USTC, China), Jian Shen (Fudan University), D. J. Keavney (APS, Argonne), Lian Li (University of Wisconsin, Milwaukee), J.M. Cao (Florida State University), G. Mankey (University of Alabama), J. Zhang (Louisiana State University), E. W. Plummer (Louisiana State University), G. M. Stocks (ORNL), J. F. Wendelken (ORNL), Kunlun Hong (ORNL), X.L. Ke (ORNL), S. Dai (ORNL), Jane Howe (ORNL), X. G. Zhang (ORNL).

Publications: (117 peer-reviewed papers)

1. “Ultrathin nanosheets of CrSiTe₃: a semiconducting two-dimensional ferromagnetic material”, Ming-Wei Lin, Houlong L. Zhuang, Jiaqiang Yan, Thomas Zac Ward, Alexander A. Puzos, Christopher M. Rouleau, Zheng Gai, Bobby Sumpter, David B. Geohegan, David Mandrus, Kai Xiao, J. Mater. Chem. C, 4, 315 (2015).
2. “Implications of Room Temperature Oxidation on Crystal Structure and Exchange Bias Effect in Co/CoO Nanoparticles”, Mikhail Feygenson, Eric V. Formo, Katherine Freeman, Natalie Schieber, Zheng Gai, and Adam J. Rondinone, J. Phys. Chem. C, 119, 26219 (2015).
3. “Epitaxial growth of intermetallic MnPt films on oxides and large exchange bias”, Zhiqi Liu, Michael D. Biegalski, Shang-Lin Hsu, Shunli Shang, Cassie Marker, Jian Liu, Li Li, Lisha Fan, Tricia L.

- Meyer, Anthony T. Wong, John A. Nichols, Deyang Chen, Long You, Zuhuang Chen, Kai Wang, Kevin Wang, Thomas Z. Ward, Zheng Gai, Ho Nyung Lee, Athena S. Sefat, Valeria Lauter, Zikui Liu, Hans M. Christen, *Advanced Materials*, in press (2015). DOI: 10.1002/adma.201502606
4. "Direct in situ measurement of coupled magnetostructural evolution in a ferromagnetic shape memory alloy and its theoretical modelin", A. Pramanick, A. Glavic, G. Sampliyuk, A. Aczel, G. Samolyuk, V. Lauter, H. Ambaye, Z. Gai, J. Ma, A. D. Stoica, G. M. Stocks, S. Wimmer, S. M. Shapiro, and X.-L. Wang, *Phys. Rev. B* 92, 134109 (2015).
 5. "Exchange bias effect in Au-Fe₃O₄ dumbbell nanoparticles induced by the charge transfer from gold", Mikhail Feygenson, John C. Bauer, Zheng Gai, Carlos Marques, Meigan C. Aronson, Xiaowei Teng, Dong Su, Vesna Stanic, Volker Urban, Peter Konarev, and Sheng Dai, *Phys. Rev. B.* 92, 054416 (2015).
 6. "Heptacopper(II) and dicopper(II)-adenine complexes: synthesis, structural characterization and magnetic properties" by B. J. M. Leite Ferreira, Paula Brandão, A.M. dos Santos, Z. Gai, C. Cruz, M. S. Reis, T. M. Santos, and Vítor Félix, *J. COORD. CHEM.* 68, 2770 (2015).
 7. "Nano-patterning of magnetic domain: Fe coverage on self-assembled alumina nanostructure", Chii-Bin Wu, Bo-Yao Wang, Wen-Chin Lin, Zheng Gai, Minn-Tsong Lin, *Appl. Phys. Express*, 8, 093002 (2015).
 8. "Dimensionality Controlled Octahedral Symmetry-Mismatch and Magnetic Functionalities in Epitaxial Correlated Cobaltite Heterostructures", Liang Qiao, Jae H. Jang, David J. Singh, Zheng Gai, H. Y. Xiao, Apurva Mehta, Rama Vasudevan, Alexander Tselev, Zhenxing Feng, Hua Zhou, Sean Li, Wilfrid Prellier, Albina Borisevich, Arthur Baddorf, Michael Biegalski, *Nano Lett.* 15, 4677 (2015).
 9. "Controlling a reversible, single axis lattice expansion in complex oxide thin films via helium implantation", Hangwen Guo, Shuai Dong, Philip D. Rack, John D. Budai, Christianne Beekman, **Zheng Gai**, Wolter Siemons, Anthony T. Wong, Paul C. Snijders, Elbio Dagotto, Thomas Z. Ward, *Phys. Rev. Lett.* 114, 256801 (2015).
 10. "Electronic and magnetic properties of epitaxial perovskite SrCrO₃(001)", K.H.L Zhang, Y. Du, P. V. Sushko, M. E. Bowden, V. Shutthanandan, L. Qiao, G. X. Cao, **Z. Gai**, S. Sallis, L.F.J. Piper, S.A. Chambers, *J. Phys. Condens. Matter* 27, 245605 (2015).
 11. "Magnetic/NIR-responsive drug carrier, multicolor cell imaging, and enhanced photothermo-therapy of gold capped magnetite-fluorescent carbon hybrid nanoparticles", Hui Wang, Guixin Cao, **Zheng Gai**, Kunlun Hong, Probal Banerjee and Shuiqin Zhou, *Nanoscale* 7, 7885 (2015).
 12. "Ferromagnetism and Nonmetallic Transport of Thin-Film α -FeSi₂: A Stabilized Metastable Material", Guixin Cao, D. J. Singh, Xiaoguang Zhang, German Samolyuk, Liang Qiao, Chad Parish, Jin Ke, Yanwen Zhang, Hangwen Guo, Siwei Tang, Wenbin Wang, Jieyu Yi, Claudia Cantoni, Wolter Siemons, E. Andrew Payzant, Michael Biegalski, T.Z. Ward, David Mandrus, Malcolm Stocks, and **Zheng Gai**, *Phys. Rev. Lett.* 114, 147202 (2015).
 13. "A Facile Solvothermal Synthesis of Octahedral Fe₃O₄ Nanoparticles", Frances Ooi, Joseph S. DuChene, Jingjing Qiu, Jeremy O. Graham, Mark H. Engelhard, Guixin Cao, **Zheng Gai**, and W. David Wei, *Small*, 11, 2649 (2015).
 14. "Growth of skyrmionic MnSi nanowires on Si: critical importance of the SiO₂ layer", Siwei Tang, Ivan Kravchenko, Jieyu Yi, Guixin Cao, David Mandrus, **Zheng Gai**, *Nano Research* 7, 1788 (2014).
 15. "Multifunctional 1D magnetic and fluorescent nanoparticle chains for enhanced MRI, fluorescent cell imaging, and combined photothermal/chemo-therapy", Hui Wang, Anton Mararenko, Guixin Cao, **Zheng Gai**, Kunlun Hong, Probal Banerjee, and Shuiqin Zhou, *ACS App. Mater. & Interfaces*, 6, 15309 (2014).

16. "Interrelation between Structure –Magnetic Properties in La_{0.5}Sr_{0.5}CoO₃", Michael. D. Biegalski, Y. Takamura, A. Mehta, **Zheng Gai**, Sergei V. Kalinin, H. Ambaye, and V. Lauter, D. Fong, Jun. He, S.T. Pantelides, Young. M. Kim, Albina Borisevich, Wolter Siemons and Hans M. Christen, *Adv. Mater. Interfaces* 1, 1400203 (2014).
17. "Strain driven anisotropic magnetoresistance in antiferromagnetic La_{0.4}Sr_{0.6}MnO₃", A.T. Wong, C. Beekman, H. Guo, W. Siemons, **Z. Gai**, E. Arenholz, Y. Takamura, and T.Z. Ward, *Appl. Phys. Lett.* 105, 052401 (2014).
18. "Chemically-induced Jahn-Teller ordering on manganite surfaces", **Zheng Gai**, Wenzhi Lin, JD Burton, K. Fuchigami, T. Z. Ward, P.C. Snijders, J. Shen, Stephen Jesse, Sergei V. Kalinin, and Arthur P. Baddorf, *Nature Comm.* 5, 4528, (2014)
19. "Active control of magnetoresistance of organic spin valves using ferroelectricity", Dali Sun, Mei Fang, Xiaoshan Xu, Lu Jiang, Hangwen Guo, Yanmei Wang, Wenting Yang, Lifeng Yin, Paul C. Snijders, T. Z. Ward, **Zheng Gai**, X.-G. Zhang, Ho Nyung Lee, and Jian Shen, *Nature Comm.* 5, 4396 (2014).
20. "Kinetics of magnetoelastic twin boundary motion in ferromagnetic shape memory alloys", A. Pramanick, X.-L. Wang, A. D. Stoica, C. Yu, Y. Ren, S. Tang, and **Z. Gai**, *Phys. Rev. Lett.* 112, 217205 (2014).
21. "Nanostructured Metal/Carbon Composites from Heterobimetallic Block Copolymers with Controlled Magnetic Properties", Jiuyang Zhang, Yi Yan, Jihua Chen, Michael W. Chance, Jeffery Hayat, **Zheng Gai** and Chuanbing Tang, *Chemistry of Materials*, 26, 3185 (2014).
22. "Jeff = ½ Mott spin-orbit insulating state close to the cubic limit in Ca₄IrO₆", S. Calder, G.-X. Cao, S. Okamoto, J. W. Kim, **Z. Gai**, B. C. Sales, M. D. Lumsden, D. Mandrus, and A. D. Christianson, *Phys. Rev. B* 89, 081104 (2014).
23. "Magnetic iron oxide–fluorescent carbon dots integrated nanoparticles for dual-modal imaging, near-infrared light-responsive drug carrier and photothermal therapy", Hui Wang, Jing Shen, Yingyu Li, Zengyan Wei, Guixin Cao, **Zheng Gai**, Kunlun Hong, Probal Banerjee and Shuiqin Zhou, *Biomaterial Sci.* 2, 915 (2014).
24. "Atomically resolved spectroscopic study of Sr₂IrO₄ : Experiment and theory", Qing Li, G.-X. Cao, Satoshi Okamoto, J.-Y. Yi, Wenzhi Lin, Brian C. Sales, J.-Q. Yan, R. Arita, J. Kunes, A. V. Kozhevnikov, A. G. Eguiluz, M. Imada, **Z. Gai**, Minghu Pan, D. Mandrus, *Scientific Reports*, 3, 3073 (2013).
25. "Multifunctional carbon-PEG encapsulated Fe₃O₄@silver hybrid nanoparticles: antibacterial activity, cell imaging and combined photothermo/chemo-therapy", Hui Wang, Jing Shen, Guixin Cao, **Zheng Gai**, Kunlun Hong, Priya Debata, Probal Banerjee and Shuiqin Zhou, *J. Mater. Chem. B* 1, 6225 (2013).
26. "Magneto-Dielectric Effects Induced by Optically-Generated Intermolecular Charge-Transfer States in Organic Semiconducting Materials", Huidong Zang , Liang Yan , Mingxing Li , Lei He , **Zheng Gai**, Ilia Ivanov, Ming Wang, Long Chiang, Augustine Urbas, and Bin Hu, *Scientific Reports*, 3, 2812 (2013).
27. "Local Crystallography Analysis from Atomically-Resolved Scanning Tunneling Microscopy Images", Wenzhi Lin, Qing Li , Alexei Belianinov, Brian C. Sales, Athena Safa-Sefat, **Zheng Gai**, Arthur P. Baddorf, Minghu Pan, Stephen Jesse, and Sergei V. Kalinin, *Nanotechnology*, 24, 415707 (2013).
28. "Porous Carbon Protected Magnetite and Silver Hybrid Nanoparticles: Morphological Control, Recyclable Catalysts, and Multicolor Cell Imaging", Hui Wang, Jing Shen, Yingyu Li, Zengyan Wei,

- Guixin Cao, **Zheng Gai**, Kunlun Hong, Probal Banerjee, and Shuiqin Zhou, ACS App. Mater. & Interfaces, 5, 9446 (2013).
29. "Synthesis of L10 Ferromagnetic CoPt Nanopowders Using a Single-Source Molecular Precursor and Water-Soluble Support", Matthew S. Wellons, **Zheng Gai**, Jian Shen, James Bentley, James E. Wittig, and Charles M. Lukehart, J. Mater. Chem. C, 1, 5976 (2013).
 30. "Electrophoretic gating used to control metal-insulator transitions in electronically phase separated manganite wires", H.W. Guo, J.H. Noh, S. Dong, P.D. Rack, **Z. Gai**, X. Xu, E. Dagotto, J. Shen, T.Z. Ward, Nano Lett. 13, 3749 (2013).
 31. "A persistent metal-insulator transition at the surface of an oxygen-deficient, epitaxial manganite film", Paul C. Snijders, Min Gao, Hangwen Guo, Guixin Cao, Wolter Siemons, Hongjun Gao, Thomas Z. Ward, Jian Shen, and **Zheng Gai**, Nanoscale, 5, 9659 (2013).
 32. "Growth diagram of La_{0.7}Sr_{0.3}MnO₃ thin films using pulsed laser deposition", Hangwen Guo, Dali Sun, Wenbin Wang, **Zheng Gai**, Ivan Kravchenko, Jian Shao, Lu Jiang, Thomas Z. Ward, Paul C. Snijders, Lifeng Yin, Jian Shen and Xiaoshan Xu, J. Appl. Phys. 113, 234301 (2013).
 33. "Room-temperature multiferroic hexagonal LuFeO₃ films", Wenbin Wang, Jun Zhao, Wenbo Wang, **Zheng Gai**, Nina Balkar, Miaofang Chi, Ho Nyong Lee, Wei Tian, Leyi Zhu, Xuemei Cheng, David Keavney, Jieyu Yi, Zac Ward, Paul Snijders, Hans M. Christen, Weida Wu, Jian Shen, and Xiaoshan Xu, Phys. Rev. Lett. 110, 237601 (2013)
 34. "Structural and magnetic property in a quantum S=1/2 dimer system Ba₃(Cr_{1-x}V_x)₂O₈ with site disorder", Tao Hong, L. Y. Zhu, X. Ke, V. O. Garlea, Y. Qiu, Y. Nambu, M. Zhu, G. E. Granroth, A. T. Savici, **Zheng Gai**, and H. D. Zhou, Phys. Rev. B, 87, 144427 (2013).
 35. "Magnetism and electronic structure of La₂ZnIrO₆ and La₂MgIrO₆:Candidate Jeff =1/2 Mott insulators", Guixin Cao, Alaska Subedi, S. Calder, J. -Q. Yan, Jieyu Yi, **Zheng Gai**, Lekhanath Poudel, David J. Singh, Mark D. Lumsden, Andrew D. Christianson, Brian C. Sales and David Mandrus, Phys. Rev. B 87, 155136 (2013).
 36. "Oxygen control of atomic structure and physical properties of SrRuO₃ surfaces", Alexander Tselev, P. Ganesh, Liang Qiao, Wolter Siemons, **Zheng Gai**, Michael D. Biegalski, Arthur P. Baddorf, and Sergei V. Kalinin, ACS Nano, 7, 4403-13 (2013).
 37. "In-situ observations and tuning of physical and chemical phenomena on the surfaces of strongly correlated oxides", **Zheng Gai**, S.V. Kalinin, An-Ping Li, Jian Shen and A. P. Baddorf, Adv. Func. Mat. 20, 2477 (2013).
 38. "Novel alkaline earth copper germanates with ferro and antiferromagnetic S = 1/2 chains", Paula Brandao, M.S. Reis, **Zheng Gai**, and Antonio M.dos Santos, J. Solid State Chemistry, 198, 39 (2013).
 39. "Magnetic structural change of Sr₂IrO₄ upon Mn doping", S. Calder, G.-X. Cao, M. D. Lumsden, J. W. Kim, **Z. Gai**, B. C. Sales, D. Mandrus, and A. D. Christianson, Phys. Rev. B 86, 220403(R) (2012).
 40. "Electronic Control Over Attachment and Self-Assembly of Alkyne Groups on Gold", Qing Li, Chengbo Han, Miguel Fuentes-Cabrera, Humberto Terrones, Bobby Sumpter, Wenchang Lu, J. Bernholc, Jieyu Yi, **Zheng Gai**, A. Baddorf, Petro Maksymovych, and M. H. Pan, ACS Nano, 6, 9267 (2012).
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42. "Versatile and Biomass Synthesis of Iron-based Nanoparticles Supported on Carbon Matrix with High Iron Content and Tunable Reactivity", Dongmao Zhang, Sheldon Shi, Charles U. Pittman, Jr, Dongping Jiang, Wen Che, **Zheng Gai**, Jane Y. Howe, Karren L. More and Arockiasamy Antonyraj, *J. Nanoparticle Res.* 14, 1023 (2012).
43. "Growth Diagram and magnetic properties of hexagonal LuFe₂O₄ Thin Films", Wenbin Wang, **Zheng Gai**, Miaofang Chi, Jason D. Fowlkes, Jieyu Yi, Leyi Zhu, Xuemei Cheng, David Keavney, Paul Snijders, Zac Ward, Jian Shen, and Xiaoshan Xu, *Phys. Rev. B* 85, 155411 (2012).
44. "Structural modulations and magnetic properties of off-stoichiometric Ni-Mn-Ga magnetic shape memory alloys", A. Pramanick, X. Wang, K. An, A.D. Stoica, **Z. Gai**, C. Hoffmann, and X-Li. Wang, *Phys. Rev. B* 85, 144412 (2012).
45. "Structural and magnetic properties of MBE grown GeMnN₂ thin films", Y. Liu, V. K. Lazarov, S. H. Cheung, D. J. Keavney, **Z. Gai**, M. Gajdardziska-Josifovska, M. Weinert, and L. Li, *Phys. Rev. B* 85, 144113 (2012).
46. "Role of nitrogen split interstitial defects in the magnetic properties of Cu-doped GaN", Y. Liu, **Z. Gai**, M. Weinert, and L. Li, *Phys. Rev. B* 85, 075207 (2012).
47. "Quenching of the initial ac Susceptibility in Single Domain Ni Nanobars", **Zheng Gai**, X.G. Zhang, I.I. Kravchenko, S. Retterer, and J.F. Wendelken, *Phys. Rev. B* 85, 024401 (2012).
48. "Multi-functional core-shell hybrid nanogels for pH-dependent magnetic manipulation, fluorescent pH-sensing, and drug delivery", Weitai Wu, Jing Shen, **Zheng Gai**, Kunlun Hong, Probal Banerjeea, and Shuiqin Zhou, *Biomaterials* 32, 9876 (2011).
49. "Tuning the metal-insulator transition in manganite films through surface exchange coupling with magnetic nanodots", T.Z. Ward, **Zheng Gai**, X.Y. Xu, H.W. Guo, Lifeng Yin, and J. Shen, *Phys. Rev. Lett.* 157207 (2011).
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51. "Coverage dependence of magnetic domain structure and magnetic anisotropy in supported Fe nanoparticles on Al₂O₃/NiAl(100)", Wen-Chin Lin, C.B. Wu, J. Hsu, H.Y. Yen, **Zheng Gai**, Lan Gao, Jian Shen, and Minn-Tsong Lin, *J. Appl. Phys.* 108, 034312 (2010).
52. "Giant magnetoresistance in organic spin valves", Dali Sun, Lifeng Yin, Chengjun Sun, Hangwen Guo, **Zheng Gai**, X.-G. Zhang, T. Z. Ward, Zhaohua Cheng, and Jian Shen, *Phys. Rev. Lett.* 104, 236602 (2010).
53. "Tuning the ferromagnetic coupling of Fe nanodots on Cu(111) via dimensionality variation of the mediating electrons", Lifeng Yin, Di Xiao, **Zheng Gai**, T.Z. Ward, N. Widiaia, G.M. Stocks, Z.H. Cheng, E.W. Plummer, Z.Y. Zhang, and J. Shen, *Phys. Rev. Lett.* 104, 167202 (2010).
54. "Elastically-Driven Anisotropic Percolation in Electronic Phase-Separated Manganites", T.Z. Ward, J.D. Budai, **Zheng Gai**, J.Z. Tischler, Lifeng Yin, and J. Shen, *Nature Physics*, 5, 885 (2009).
55. "Magnetic interaction in Fe nanoparticle assemblies studied by scanning electron microscopy with polarization analysis", Wen-Chin Lin, **Zheng Gai**, Lan Gao, Jian Shen, Pin-Jui Hsu, Hong-Yu Yen, and Minn-Tsong Lin, *Phys. Rev. B* 80, 024407 (2009).
56. "Tunable Metallicity of the La_{5/8}Ca_{3/8}MnO₃(001) Surface by an Oxygen Overlayer", K. Fuchigami, **Zheng Gai**, T. Z. Ward, L. F. Yin, P.C. Snijders, E. W. Plummer, and J. Shen, *Phys. Rev. Lett.* 102, 066104 (2009).

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58. "Direct Synthesis and Size Selection of Ferromagnetic FePt Nanoparticles", Matthew S. Wellons, William H. Morris, III, **Zheng Gai**, Jian Shen, James Bentley, James E. Wittig, and Charles M. Lukehart, Chem. Mater. 19, 2483 (2007).
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60. "Formation of FePt Nanoparticles Having Exceptionally High Coercivity", Ryan D. Rutledge, William H. Morris, Matthew S. Wellons, **Zheng Gai**, Jian Shen, J. Bentley, James E. Wittig, and Charles M. Lukehart, J. Am. Chem. Soc. 128, 14210 (2006).
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66. "Electronic Stability of Magnetic Fe/Co Superlattices with Monoatomic Layer Alternation", G.A. Farnan, C. L. Fu, **Z. Gai**, M. Krcmar, A.P. Baddorf, Z.Y. Zhang, and J. Shen, Phys. Rev. Lett. 91, 226106 (2003).
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