

CURRICULUM VITAE - ZHAO HAO

AREAS OF EXPERTISE

- Infrared Fourier-transform spectroscopy and microscopy, and infrared detectors.
- Nanometer sized metamaterials and their near-field applications.
- Time-resolved spectroscopy.

EDUCATION

- 1997-2000 *Ph.D.* Condensed Matter Physics *Chinese Academy of Sciences*
Thesis title: "Investigation of physical properties of high Tc superconductor/Ferroelectrics heterostructure thin films"
- 1994-1997 *M.S.* Solid State Physics *Nankai University*
Thesis title: "Upconversional photoluminescence of rare-earth ions doped in glasses"
- 1990-1994 *B.S.* Physics *Nankai University*
Thesis title: "Study on photonic diodes based on photochromatic materials".

PROFESSIONAL EXPERIENCE

- 2005-pres. **Scientific Engineering Associate** *Lawrence Berkeley National Laboratory*
Berkeley, California
- 2003-2005 **Physicist Postdoctoral Fellow** *Lawrence Berkeley National Laboratory*
Berkeley, California
- 2002-2003. **Research Associate** *National High Magnetic Field Laboratory*
Tallahassee, Florida
- 2000-2002 **Visiting Scientist** *Superconductivity Research Laboratory*
International Superconductivity Technology Center, Tokyo, Japan

HONORS AND AWARDS

- 2000 Science & Technology Agency (STA) Fellowship, Japan.
- 2000 Excellent Graduated Award, Institute of Physics, CAS.
- 1997 Excellent Graduated Student, Nankai University.
- 1997 Excellent Thesis Award and Certificate, Nankai University.
- 1990-1997 Scholarship per annum, Nankai University.
- 1988 Third-Class Award of National Physics Competition, China.

PUBLICATIONS

- [1] Hoi-Ying N. Holman, Robin Miles, Zhao Hao, Eleanor Wozei, L. Meadow Anderson, Haw Yang, *Real-Time Chemical Imaging of Bacterial Activity in Biofilms Using High-Resolution Microfluidic Synchrotron FTIR Spectromicroscopy*, **Anal. Chem.**, to be published (2009).
- [2] Y. Zhang, T. Tang, C. Girit, Z. Hao, M. C. Martin, A. Zettl, M. F. Crommie, Y. R. Shen, F. Wang, *Direct observation of a widely tunable bandgap in bilayer graphene*, **Nature** 459, 820 (2009).
- [3] Z. Q. Li, E. A. Henriksen, Z. Jiang, Z. Hao, M. C. Martin, P. Kim, H. L. Stormer, and D. N. Basov, *Dirac charge dynamics in graphene by infrared spectroscopy*, **Nature Physics**, 4, 532 (2008).
- [4] M. Rini, Z. Hao, R. W. Schoenlein, C. Giannetti, F. Parmigiani, S. Fourmaux, J. C. Kieffer, A. Fujimori, M. Onoda, S. Wall, and A. Cavalleri, *Optical switching in VO₂ films by below-gap excitation*, **Appl. Phys. Lett.** 92, 181904 (2008).
- [5] Zhao Hao, Michael C. Martin, Bruce Harteneck, Stefano Cabrini, Erik H. Anderson, *Negative Index of Refraction Observed in a Single Layer of Closed Ring Magnetic Dipole Resonators*, **Appl. Phys. Lett.**, 91, 253119 (2007).
- [6] J.M. Byrd, Z. Hao, M. C. Martin, D. S. Robin, F. Sannibale, R. W. Schoenlein, M. Venturini, A.A. Zholents, M.S. Zolotarev, *Laser Seeding of the Storage-Ring Microbunching Instability for High-Power Coherent Terahertz Radiation*, **Phys. Rev. Lett.** 96, 164801 (2006).
- [7] J.M. Byrd, Z. Hao, M. C. Martin, D. S. Robin, F. Sannibale, R. W. Schoenlein, M. Venturini, A.A. Zholents, M.S. Zolotarev, *Tailored terahertz pulses from a laser-modulated electron beam*, **Phys. Rev. Lett.** 97, 074802 (2006).
- [8] Jianming Cao, Zhao Hao, Hyuk Park, Chenggang Tao, Lukasz Blaszczyk, Daekwang Kau, *Femtosecond Electron Diffraction for Direct Measurement of Ultrafast Atomic Motions*, **Appl. Phys. Lett.** 83, 1044 (2003).
- [9] Z. Hao, B.R. Zhao, B.Y. Zhu, Z. X. Zhao, J. Vanacken, and V. V. Moshchalkov, *Transport properties of the underdoped Y_{0.5}Pr_{0.5}Ba₂Cu₃O_{7-δ} films in high magnetic fields*, **Europhys. Lett.**, 58 (1), 105 (2002).
- [10] Z. Hao, Y. Enomoto, Y. Wu, K. Tanabe, *Transport properties of bicrystal YBa₂Cu₃O_{7-d} Josephson junctions*, **Physica C** 378, 1334-1338(2002).
- [11] Z. Hao, Y. Wu, Y. Enomoto, K. Tanabe, N. Koshizuka, *Extremely smooth YBa₂Cu₃O_{7-d} "thin" film grown by liquid phase epitaxy*, **J. Cryst. Growth** 235, 253-257 (2002).
- [12] Z. Hao, Y. Wu, Y. Enomoto, K. Tanabe, N. Koshizuka, *Microstructure and magnesium diffusion in YBa₂Cu₃O_{7-d} films on bicrystal MgO substrates*, **J. Appl. Phys.**, 91, 9251(2002).
- [13] Z. Hao, B. R. Zhao, B. Y. Zhu, Y. M. Ni, Z. X. Zhao, *Magnetic Field Induced Superconductor-Insulator Transition and Abnormal Hall Effect in Y_{0.5}Pr_{0.5}Ba₂Cu₃O_{7-δ} Thin Films*, **Physica C**, 341-348, 1891(2000).
- [14] Z. Hao, B. T. Liu, B. Xu, F. Wu, H. J. Tao, B. Y. Zhu, Z. X. Zhao, B. R. Zhao, *Large Area Ferroelectricity of the Smooth Epitaxial Pb(Zr_{0.53}Ti_{0.47})O₃ / YBa₂Cu₃O_{7-d} Film*, **Supercond. Sci. & Tech.**, 13, 316 (2000).

- [15] Zhao Hao, Xiaobo Chen, Yanbing Hou, Feng Song, Hong Wang, Guangyin Zhang, Blue upconversion luminescence in Yb^{3+} and Tm^{3+} codoped Phosphate glass, *Acta Physica Sinica* (in Chinese) 5, 100(1997).
- [16] Zhao Hao, Xiaobo Chen, Guangyin Zhang, Yanbing Hou, Hong Wang, Zengfu Song, Frequency upconversion of the excited state in Yb^{3+} and Er^{3+} doped ZBLAN, *Journal of Photonics* (in Chinese), vol.26, No.4, (1997).
- [17] Zhao Hao, Xiaobo Chen, Guangyin Zhang, Meixian Li, Yuhong Mao, Zhiping Feng, Computational analysis of four-level dynamic avalanche upconversion process, *Journal of Infrared and Millimeter Wave* (in Chinese), No.1, (1997).
- [18] Zhao Hao, Xiaobo Chen, Guangyin Zhang, Feng Song, Yanbing Hou, *Blue upconversion with excitation at 970 nm in $\text{Yb}_{0.18}$ -doped $\text{Tm}_{0.03}\text{La}_{0.97}\text{P}_5\text{O}_{14}$ / $\text{Tm}_{0.1}\text{La}_{0.9}\text{P}_5\text{O}_{14}$* , *Proc. SPIE Int. Soc. Opt. Eng.* 2897, 275 (1996).
- [19] Zhao Hao, Xiaobo Chen, Guangyin Zhang, *Computational analysis of "photonic transistor"*, *Spectroscopy and spectrum analysis* (in Chinese), 15(6), 5 (1995).
- [20] H. Park, Z. Hao, X. Wang, S. Nie, R. Clinite, and J. Cao, *Synchronization of femtosecond laser and electron pulses with sub-picosecond precision*, *Rev. Sci. Instrum.* 76, 083905 (2005).
- [21] B. T. Liu, Z. Hao, Y. F. Chen, B. Xu, H. Chen, F. Wu, B. R. Zhao, Yu. Kisilinskii, and E. Stepanov, *Investigation on $\text{Ag} / \text{Pb}(\text{Zr}_{0.53}\text{Ti}_{0.47})\text{O}_3 / \text{YBa}_2\text{Cu}_3\text{O}_{7-\delta}$ Three-terminal System With Small Gate Area*, *Appl. Phys. Lett.*, 74, 2044 (1999).
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- [23] Youichi Enomoto, Zhao Hao, Satoru Hirano, and Katsumi Suzuki, *Characteristics of Long Grain Boundary Josephson Junctions on Bicrystal Substrates*, *Jpn. J. Appl. Phys.*, 41, 925(2002).
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- [25] Y. Wu, Z. Hao, S. Adachi, Y. Enomoto, K. Tanabe, *Microstructural Relationship between $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ seed films and thick films grown by liquid phase epitaxy*, *Physica C* 378, 984-988(2002).
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- [28] J. van Tilborg, C. G. R. Geddes, C. Tóth, E. Esarey, C. B. Schroeder, M. C. Martin, Z. Hao, and W. P. Leemans, *Coherent Transition Radiation From a Laser Wakefield Accelerator as an Electron Bunch Diagnostic*, *AIP Conf. Proc.* 737, 372 (2004).
- [29] Yuan Lin, Weizhi Gong, Chun Cai, Zhao Hao, Bo Xu, Bairu Zhao, *Effect of the charge distribution at the interface on the properties of PZT / SiO_2 / Si heterostructure*, *Ferroelectrics*, 252, 321-328(2001).
- [30] Yuan Lin, Baoting Liu, Zhao Hao, Weizhi Gong, Chun Cai, Bo Xu, Bairu Zhao, *Fabrication and characteristics of $\text{Ag} / \text{Pb}(\text{Zr}_{0.53}\text{Ti}_{0.47})\text{O}_3 / \text{ultrathin-SiO}_2 / \text{Si}$ and $\text{Ag} / \text{Pb}(\text{Zr}_{0.53}\text{Ti}_{0.47})\text{O}_3 / \text{YBa}_2\text{Cu}_3\text{O}_{7-d}$ systems*, *Ferroelectrics*, 252, 329-336(2001).

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- [37] Z. H. Mai, A. J. Zhu, B. T. Liu, C. R. Liu, C. R. Li, S. F. Cui, Z. Hao, and B. R. Zhao, *Structural study of PZT/YBCO by triple-axes diffraction*, *Inter. J. of Mod. Phys.* 13, 383 (1999).
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PRESENTATIONS

- [1] Zhao Hao, *Electric and magnetic resonances in closed ring resonators (Invited)*, Nanophotonics Workshop, Molecular Foundry User Meeting, Berkeley, CA (October, 2007).

- [2] Zhao Hao, Michael C. Martin, Bruce Harteneck, Stefano Cabrini, Erik H. Anderson, Willie J. Padilla, *Direct Magnetic Resonances with Infrared Light from Plasmonic Single Closed Ring Resonators*, APS March Meeting, Denver, CO (March, 2007).
- [3] Michael C. Martin, Zhao Hao, Bruce Harteneck, Alex Liddle, Stefano Cabrini, Willie J. Padilla, *Strong Broadband Resonances Observed between 1 and 3 microns from Nanolithographically Fabricated Metallic Metamaterials*, APS March Meeting, Denver, CO (March, 2007).
- [4] Zhao Hao, Donnacha Lowney, Phil Heimann, Roger Falcone, Robert Schoenlein, Andrew Macphee, Howard Padmore, *Grazing incidence streak camera for ultrafast x-ray applications*, ***SPIE Symposium on Optics & Photonics***, San Diego (Oct. 2005).
- [5] Michael C. Martin, Zhao Hao, Alex Liddle, Erik H. Anderson, Willie J. Padilla, David Schurig, David R. Smith, *Fabrication and Optical Measurements of Nanoscale Meta-Materials: Terahertz and Beyond*, IRMMW-THz2005 Conference, IEEE, Williamsburg, Virginia, (September, 2005).
- [6] Michael C. Martin, John Byrd, Zhao Hao, David Robin, Fernando Sannibale, Robert W. Schoenlein, Alexander Zholents, Max Zolotarev, *Tailored terahertz pulses from a laser-modulated electron beam*, IRMMW-THz2005 Conference, IEEE, Williamsburg, Virginia (September, 2005).
- [7] J.M. Byrd, Z. Hao, M. C. Martin, D.S. Robin, F. Sannibale, R.W. Schoenlein, A.A. Zholents, M.S. Zolotarev, *Terahertz coherent synchrotron radiation from femtosecond laser modulation of the electron beam at the advanced light source*, ***European Particle Accelerator Conference, Lucerne Congress Center, Swiss*** (2005).
- [8] Zhao Hao, Michael C. Martin, Alex Liddle, Erik H. Anderson, Willie J. Padilla, David Schurig, David R. Smith, *Fabrication and Optical Measurements of Nanoscale Meta-Materials: Terahertz and Beyond*, ***APS March Meeting***, Los Angeles, CA (March, 2005).
- [9] J.M. Byrd, Z. Hao, M.C. Martin, D.S. Robin, F. Sannibale, R.W. Schoenlein, M. Venturini, A.A. Zholents, M.S. Zolotarev, *Coherent infrared radiation from the ALS generated via femtosecond laser modulation of the electron beam*, ***Particle Accelerator Conference, Knoxville, TN*** (May, 2005).
- [10] J. van Tilborg, C. G. R. Geddes, C. Tóth, E. Esarey, C. B. Schroeder, M. C. Martin, Z. Hao, and W. P. Leemans, *Coherent Transition Radiation From a Laser Wakefield Accelerator as an Electron Bunch Diagnostic*, ***AIP Conferenc*** (2004).
- [11] Zhao Hao, *"Time zero" measurement methods for UED and UEM (Invited)*, ***First National Laboratory and University Alliance Workshop on Ultrafast Electron Microcopies***, Livermore (2004).
- [12] Zhao Hao, *Femtosecond Electron Diffraction and Ultrafast Heating in Metals (Invited)*, ***ALS/CXRO Seminar Series***, Berkeley, California (August, 2003).
- [13] Zhao Hao, Hyuk Park, Chenggang Tao, Jianming Cao, *Femtosecond Electron Diffraction Observation of Ultrafast Structural Changes in Metal Films*, ***APS March Meeting***, Austin, TX (2003).
- [14] Z. Hao, Y. Enomoto, Y. Wu, K. Tanabe, *Transport properties of bicrystal $YBa_2Cu_3O_{7-d}$ Josephson junctions*, ***14th International Symposium on Superconductivity*** (ISS 2001), Kobe, Japan (2001).
- [15] Y. Wu, Z. Hao, S. Adachi, Y. Enomoto, K. Tanabe, *Microstructural Relationship between $YBa_2Cu_3O_{7-x}$ seed films and thick films grown by liquid phase epitaxy*, ***14th International Symposium on Superconductivity*** (ISS 2001), Kobe, Japan (2001).

- [16] Z. Hao, Y. Enomoto, *Growth and Microstructure of $YBa_2Cu_3O_{7-d}$ thin films on bicrystal MgO substrates By Liquid Phase Epitaxy (invited)*, **The 62nd Annual Meeting of Japanese Society of Applied Physics**, Nigoya, Japan (September, 2001).