

# Lei Fang

Center for Quantum Nanoscience, Institute for Basic Science (IBS) Seoul 03760, Republic of Korea

---

## EDUCATION

- Ph. D. Physics,** The Ohio State University, March 2011, *Advisor: Dr. Ezekiel Johnston-Halperin*  
Specialization: Physics, Condensed Matter Experiment
- Bachelor of Science,** University of Science and Technology of China, July 2004  
Major: Physics

## PROFESSIONAL EMPLOYMENT

### **Research Staff, Seoul, Republic of Korea (April 2017-present)**

#### **Center for Quantum Nanoscience, Institute for Basic Science (IBS) at Ewha womans University**

- Designing the He3 gas handling and vacuum pumping system for the new QNS science building.
- Solve technical issues of scientific projects.

### **Postdoctoral Fellow, College Park, MD (Jan. 2012 – Oct. 2014)**

#### **Department of Materials Science and Engineering, University of Maryland**

Synthesis and characterization of exchange coupled rare-earth-free permanent magnet material MnBi<sub>x</sub>Co<sub>1-x</sub>/Fe. Realize energy product ((BH)<sub>max</sub>) of 25MGOe at room temperature.

- Optimizing and Synthesis of rare-earth-free permanent magnetic material MnBi<sub>x</sub>Co<sub>1-x</sub>/Fe by DC/RF sputtering system.
- Synthesis and characterization of varieties of combinatorial thin film libraries in search of novel multifunctional materials
- Setting up and leading scanning magneto-optical Kerr measurements for magnetic materials (both longitudinal and transverse depending on easy axis of the material).

### **Postdoctoral Fellow, Columbus, OH (March 2011- Aug. 2011)**

#### **Department of Physics, The Ohio State University**

Magneto-Optical Kerr effect measurement of AC susceptibility of complex oxide system

### **Graduate Research Assistant, Columbus, OH (June 2004- March 2011)**

#### **Department of Physics, The Ohio State University**

Using Magneto-Optical Kerr effect, first time demonstrate the ferromagnetic property of the world first strong ferromagnetic ferroelectric (multiferroic) material EuTiO<sub>3</sub>/DyScO<sub>3</sub>, results publish in Nature

- Design, set up and perform the MOKE experiment in Helium 4 Spectromag system:

Demonstrate optical spin detection of electric spin injection from an organic based ferrimagnet V[TCNE]<sub>x-2</sub> to an inorganic semiconductor (GaAs/AlGaAs quantum well) hybrid heterostructure, laying the foundation for a new class of multifunctional hybrid spintronics structures.

- Design, set up and perform spin-LED (light emitting diode) measurements in organic/inorganic hybrid structures to optically detect electrical spin injection in a cryogenic system
- Design and fabrication on organic/inorganic hybrid devices

Study the polarization anisotropy of randomly oriented nanowire ensembles. Investigate control of the polarization anisotropy by dielectric matching of the nanowires with dielectric close materials.

- Design and perform polarization dependent photoluminescence measurement on nanowire ensembles (InP, ZnO nanowires) in Spectromag system
- Pulsed laser deposition of III-V, II-IV semiconductor nanowires

Cathodode luminescence measurements of ZnO nanowires and Si/HfO<sub>2</sub>/Mo gate oxide heterostructures

**Graduate Teaching Assistant, Columbus, OH (Sept. 2004- Dec. 2006)**

**Department of Physics, The Ohio State University**

Teach general physics lab (Mechanics) to science and engineering majors.

Grade exams, quizzes, and homework.

### PUBLICATIONS:

1. “Large energy product enhancement in perpendicularly coupled MnBi/CoFe magnetic bilayers”  
T. R. Gao, **L. Fang**, S. Fackler, S. Maruyama, X. H. Zhang, L. L. Wang, T. Rana, P. Manchanda, A. Kashyap, K. Janicka, A. L. Wysocki, A. T. N’Diaye, E. Arenholz, J. A. Borchers, B. J. Kirby, B. B. Maranville, K. W. Sun, M. J. Kramer, V. P. Antropov, D. D. Johnson, R. Skomski, J. Cui, and I. Takeuchi, *Phys. Rev. B.* 94, 060411(R) (2016) ;
2. “Comprehensive Control of Optical Polarization Anisotropy in Semiconducting Nanowires”  
**Lei Fang**, Xianwei Zhao, Yi-Hsin Chiu, Dongkyun Ko, Kongara M. Reddy, Thomas R. Lemberger, Nitin Padture, Fengyuan Yang and E. Johnston- Halperin, *Appl. Phys. Lett.* 99, 141101(2011)
3. “Electrical spin injection from an organic-based ferrimagnet in a hybrid organic/inorganic heterostructure”  
**Lei Fang**, K. D. Bozdag, Chia-Yi Chen, P. A. Truitt, A. J. Epstein and E. Johnston-Halperin, *Phys. Rev. Lett.* 106, 156602 (2011)
4. “A strong ferroelectric ferromagnet created by means of spin-lattice coupling”  
June Hyuk Lee, **Lei Fang**, Eftihia Vlahos, Xianglin Ke *et al.* Nature, 466, 954-959 (2010)
5. “Process-dependent defects in Si/HfO<sub>2</sub>/Mo gate oxide heterostructures”  
Shawn Walsh, **Lei Fang**, J. K. Schaeffer, E. Weisbrod and L. J. Brillson, *Appl. Phys. Lett.* 90, 052901 (2007)
6. “Process-dependent electronic states at Mo/hafnium oxide/Si interface”  
Shawn Walsh, **Lei Fang**, J. K. Schaeffer and L. J. Brillson, *J. Vac. Sci. Technol., A.* 25, 1261 (2007)

### INVITED PRESENTATIONS:

1. *SPIE Optics and Photonics Conference*: San Diego, CA, USA. Aug. 2011,  
Title: “Electrical spin injection from an organic-based magnet in a hybrid organic/inorganic heterostructure”

### CONTRIBUTED PRESENTATIONS:

1. 58<sup>th</sup> MMM conference, Denvor, USA. Nov. 2013  
Title: “Exchange coupling study of MnBi/Fe-Co bilayers”
2. Gordon Research Conference: Magnetic nanostructure; Bates College, Lewiston, USA. Aug. 2010  
Poster Title: “Electrical spin injection from an organic-based magnet in a hybrid organic/inorganic heterostructure”

3. 52<sup>nd</sup> Electronic Materials Conference; Notre Dame, USA. June 2010  
Title: “The Magneto-Optic Kerr Effect (MOKE) as a Measure of Strain-Induced Ferromagnetism in EuTiO<sub>3</sub> grown by Molecular-Beam Epitaxy”
4. MRS Spring Meeting , San Francisco, USA. April 2010  
Title: “Polarization dependent photoluminescence studies of InP Nanowires”
5. Annual meeting of the American physical society; Portland, USA. Mar 2010  
Title: “Optical detection of electrical spin injection in a V[TCNE]<sub>x~2</sub> based hybrid spin LED”
6. Annual meeting of the American physical society; Pittsburgh, USA. Mar 2009  
Title: “Polarization dependent photoluminescence studies of InP Nanowires”
7. 48<sup>th</sup> Electronic Materials Conference; University Park, USA. June 2006  
Title: “Spatially-dependent optical emission from ZnO nanotips on Al<sub>2</sub>O<sub>3</sub> and Si.”

**LANGUAGES:**

- English: Fluent in reading, writing and speaking
- Chinese: Native language