Jiasen Guo

3049 Legacy Pointe Way Apt. 1134, Knoxville, TN 37921

573-554-6509 jiasenguo1993@gmail.com

Education

University of Missouri, Columbia **Jan. 2018 – Dec. 2023**
Doctor of Philosophy in Physics, GPA 3.94 *Missouri, US*

University of Missouri, Columbia **Aug. 2015 – Dec. 2017**
Master of Science in Chemical Engineering *Missouri, US*

University of Missouri, Columbia **Aug. 2015 – Aug. 2016**
Undergraduate exchange program in Chemical Engineering, GPA 3.88 *Missouri, US*

East China University of Science and Technology **Sept. 2012 – June 2015**
Bachelor of Engineering in Chemical Engineering, GPA 3.78 *Shanghai, China*

Research Experience

Spallation Neutron Source, Oak Ridge National Laboratory **Oct. 2023 – present**
Postdoctoral research, Advisor: Zachary Morgan *Tennessee, US*

- Bulk material magnetic structure refinement via single crystal neutron scattering.
- Developing beam line data analysis software for magnetic diffuse neutron scattering via mean-field approach.

University of Missouri, Columbia **Aug. 2019 – Sept. 2023**
Ph.D. program, Advisor: Deepak K. Singh *Missouri, US*

Magnetic thin film

- Optimized the hierarchical nanofabrication process of 2D artificial magnetic honeycomb thin films using self-assembling diblock copolymers and E-beam physical vapor deposition.
- Imaged nano-structured thin films using atomic force microscopy on a daily basis.
- Characterized magnetic and electrical properties of nano-engineered 2D artificial magnetic honeycomb thin films using electric transport and magnetic SQUID measurements.
- Studied the magnetic charge dynamics in the 2D artificial magnetic honeycomb system using neutron spin echo (SNS-ORNL) and polarized neutron reflectometry methods. (SNS-ORNL)
- Investigated magnetic phase transitions with temperature and field changes in the 2D artificial magnetic honeycomb system using the small angle neutron scattering method. (HFIR-ORNL)
- Simulated the unidirectional electric conduction in the 2D magnetic honeycomb system via in-plane spin torque transfer as well as its magnetic hysteresis loop using micromagnetic simulations.
- Calculated the Hall conductivity of long-range ordered magnetic honeycomb lattice using Green's function in conjunction with second-order perturbation method.

Magnetic bulk material

- Performed elastic neutron scattering measurements with TRIAX (MURR) and CORELLI (SNS-ORNL) on single crystal specimens and refined the corresponding magnetic structures.
- Grew single crystal specimens of frustrated pyrochlore oxides with an optical floating zone furnace.
- Developed a flexible classical Monte Carlo program in C++ for the simulation of the magnetic phase transitions of general Heisenberg spin systems.
- Performed density functional theory calculations for Cr-doped ZnTe to supplement neutron scattering findings.

University of Missouri, Columbia **Jan. 2018 – Aug. 2019**
Ph.D. program, Advisor: Carlos Wexler *Missouri, US*

- Reconstructed the free energy surface of the dissolve process of organic acids in aqueous environment via non-Boltzmann sampling using molecular dynamics simulations.
- Developed a parallel Python program suite for the parameterization of general Reactive Force Fields based on a genetic algorithm.
- Developed a reweighting program in C++ that reconstructs the free energy surface explored by sliced metadynamics simulations constrained by umbrella sampling bias.
- Explored the potential of water absorption on the surface of graphene oxide with classical molecular dynamics simulations.

University of Missouri, Columbia **Aug. 2015 – Dec. 2017**
MS program, Advisor: Karl Hammond *Missouri, US*

- Examined potentials for the computer simulation of Infrared vibrational spectroscopy of siliceous zeolites with quantum mechanical simulations and classical molecular dynamics simulations
- Developed new potentials for the modeling of the Infrared vibrational spectroscopy of siliceous zeolites.
- Modeled the photoluminescent spectra in Zeolites using quantum mechanical simulations.

Publications

- **J. Guo**, A. Albesa, C. Wexler. Advantages of multidimensional biasing in accelerated dynamics: application to the calculation of the acid pK_a for acetic acid. *J. Phys. Chem. B* **127**, 39, 8446–8455 (2023).
- **J. Guo**, D. K. Singh. Diode type unidirectional conduction in Hall measurement of magnetic honeycomb lattice. *Phys. Lett. A* **489**, 129150 (2023).
- P. Ghosh, **J. Guo***, F. Ye, T. Heitmann, S. Kelley, A. Ernst, V. Dugaev, D. K. Singh. High temperature antiferromagnetism in metallic NiSi with implication for spintronics. *Adv. Mater.* **35**, 2302120 (2023). (* Equal contribution)
- **J. Guo**, A. Sarikhani, P. Ghosh, T. Heitmann, Y. S. Hor, D. K. Singh. Chemically induced ferromagnetism near room temperature in single crystal ($Zn_{1-x}Cr_x$)Te half-metal. *RSC Adv.* **13**, 8551-8556 (2023).
- **J. Guo**, P. Ghosh, D. Hill, Y. Chen, L. Stingaciu, P. Zolnierczuk, C. A. Ullrich, D. K. Singh. Persistent dynamic magnetic state in artificial honeycomb spin ice. *Nat. Commun.* **14**, 5212 (2023).
- **J. Guo**, V. Dugaev, A. Ernst, G. Yumnam, P. Ghosh, D. K. Singh. Topological monopole's gauge field induced anomalous Hall effect in artificial honeycomb lattice. *Nat. Sci.* **2**, e210083 (2022).
- **J. Guo**, G. Yumnam, A. Dahal, Y. Chen, V. Lauter, D. K. Singh. Local Spin Ice Order Induced Planar Hall Effect in Nd-Sn Artificial Honeycomb Lattice. *Adv. Electron. Mater.* **7**, 2100079 (2021).
- G. Yumnam, Y. Chen, **J. Guo**, J. Keum, V. Lauter, D. K. Singh. Quantum Disordered State of Magnetic Charges in Nanoengineered Honeycomb Lattice. *Adv. Sci.* **8**, 2004103 (2021).
- G. Yumnam, **J. Guo***, Y Chen, A. Dahal, P. Ghosh, Q. Cunningham, J. Keum, V. Lauter, A. Abdullah, M. Almasri, D. K. Singh. Magnetic charge and geometry confluence for ultra-low forward voltage diode in artificial honeycomb lattice. *Mater. Today Phys.* **22**, 100574 (2021). (* Equal contribution)
- G. Yumnam, **J. Guo**, D. K. Singh. Various facets of magnetic charge correlation: Micromagnetic and distorted wave Born approximation simulations study. *Phys. Rev. B* **104**, 134429 (2021).
- G. Yumnam, **J. Guo**, Y. Chen, V. Lauter, D. K. Singh. Nonconventional magnetic phenomena in neodymium thin film. *Phys. Rev. Research* **2**, 043018 (2020).
- **J. Guo**, K. D. Hammond. Comparison of Siliceous Zeolite Potentials from the Perspective of Infrared Spectroscopy. *J. Phys. Chem. C* **122**, 11, 6093–6102 (2018).
- **J. Guo**, K. D. Hammond. A Potential for the Simulation of Siliceous Zeolites Fit to the Infrared Spectra of Silica Polymorphs. *J. Phys. Chem. C* **122**, 21, 11345–11354 (2018).

Presentations

Oral

- **Anomalous Hall Effect due to Topological Magnetic Charge Correlation in Honeycomb Lattice**
  Presented at: American Physical Society March Meeting; March 2022; Chicago, IN.
- **Quantum Mechanical Nature of Magnetic Charge Dynamics in Artificial Honeycomb Ice**
  Presented at: American Physical Society March Meeting; March 2023; Las Vegas, NV.

Poster

- **Quantum Mechanical Nature of Magnetic Charges in Artificial Magnetic Honeycomb Lattice**
  Presented at: American Conference on Neutron Scattering; June 2022; Boulder, CO.

Skills

Material Synthesis

- **Bulk material: self-flux solid state reaction, optical floating zone.**
- **Thin film: E-beam assisted physical vapor deposition, solvent vapor annealing.**

Experimental Characterizations

- **Neutron scattering: NSE, PNR, TRIAX, SANS, CORELLI.**
- **Electric transport measurement: magnetoresistance, Hall effect.**
- **Magnetic measurement: SQUID magnetometer.**
- **Microscopy: AFM, SEM.**

Computer Simulations

- **Electronic structure calculations (DFT): Gaussian, Quantum Espresso**
- **Molecular dynamics: LAMMPS, GULP**
- **Non-Boltzmann sampling: metadynamics, umbrella sampling**
- **Micromagnetic simulation: OOMMF, Mumax**

Programing Language

- **Python, C++, Matlab, Bash.**

Working Experience

Research assistant **Aug. 2020 – Sept. 2023**
Research assistant focusing on magnetic bulk material and nanostructured magnetic thin films. *Missouri, US*

Teaching assistant **Aug. 2018 – May 2020**
Teaching assistant for *introductory physics labs* in the department of Physics and Astronomy *Missouri, US*

Teaching assistant **Aug. 2016 - Dec. 2017**
Teaching assistant for *process control* in the department of Chemical Engineering *Missouri, US*

Honors and Awards

National Sponsorship **2015**
Chinese Scholarship Council *Shanghai, China*

National Chemical Engineering Competition (East China), first prize **2015**
Chinese Institute of Chemical Engineering *Shanghai, China*

Comprehensive Curriculum Scholarship, first class **2013/2014**
East China University of Science and Technology *Shanghai, China*

Entrepreneur Scholarship **2014**
Hualu Tech. *Shanghai, China*

Entrepreneur Scholarship **2013**
Ashland *Shanghai, China*