Mohammed Hamad Aldosary

Department of Physics & Astronomy moaldosary@ksu.edu.sa King Saud University

Curriculum Vitae

Education:

2012 –2018: **Ph.D. in Condensed Matter Physics**, *University of California, Riverside, USA*

Thesis Title: *"Garnet Materials Development and Spin Transport Phenomena in Magnetic Insulator/ Normal Metal Heterostructures"*.

Graduate Advisor: Prof. Jing Shi, Department of Physics, University of California, Riverside.

2007 –2009: **Master of Science (Physics)**, *The University of Queensland, Australia*

Dissertation Title: *" Experimental Investigation of Luminescence and Chemical Etching in nitrogen-vacancy centers nanodiamonds"*.

Graduate Advisors: Dr. Taras Plakhotnik and Dr. Daniel Gruber, Department of Physics, University of Queensland

1998 –2002: **B.S. in Physics**, *King Saud University, Riyadh, KSA*

Appointments:

Dec. 2018 – Present Assistant professor, Department of Physics and Astronomy, King Saud University, Riyadh

April 2010 – Dec. 2018 Lecturer, Department of Physics and Astronomy, King Saud University, Riyadh

July 2002 – April 2010 Demonstrator, Department of Physics and Astronomy, King Saud University, Riyadh

Research Experience:

01/2013 – 09/2018: PhD Student University of California, Riverside, Jing Shi Lab

SHINES Energy Frontier Research Center

- Atomic level control of iron garnet thin film growth and magnetic anisotropy engineering
- Magneto-transport in magnetic insulator/heavy metal heterostructures
- Exploration of spin dynamic in magnetic insulator/heavy metal heterostructures

2007 - 2009: Master Student University of Queensland, Optical Nano Probe, Taras Plakhotnik Lab

- Optical properties characterization of Nitrogen-vacancy centers in nano-diamond

Technique Skills:

- **5 years of experience in thin film growth & research**: complex magnetic oxide film, magnetic metal film, heavy metal film, thin film heterostructure and high dielectric constant oxides.
- **Hands-on experience in deposition techniques:** Pulsed Laser Deposition (PLD), E-beam Evaporation and Sputtering Deposition (DC, RF).

- **Proficient in nano- fabrication & plasma etch processes:** Photolithography, Optical Mask Design, Wet Etch, Inductively Coupled Plasma Etch (ICP), Ion Milling, Rapid Thermal Annealing (RTA) and wire bonding.
- **Experienced in materials characterization techniques**: Atomic Force Microscopy (AFM), X-ray Diffraction (XRD), Profilometry, Ellipsometry, Vibrating Sample Magnetometry (VSM), Electrical Characterization (DC, AC &RF).
- **Strong computer and data analysis skills:** Matlab, Labview, Origin, and MS Office.
- **Maintained and supervised the EFRC- Spins and Heat in Nanoscale Electronic Systems website** from Aug. 2014 to Oct. 2018.

Honors and Awards:

1- The Robert T. Poe Memorial Scholarship Award for Outstanding Ph.D. Graduate, Graduation Recognition Ceremony, Class of 2018, Department of Physics and Astronomy, University of California, Riverside, USA, June/16/2018.
2- Student Travel Grant Award for Magnetism and Magnetic Materials (MMM) Conference, Pittsburgh, Pennsylvania, USA, Nov. 2017.
3- 2nd Annual SHINES Best Poster Award. Title "Garnet-based Magnetic Insulator Films and Heterostructure". Energy Frontier Reach Center on Spins and Heat in Nanoscale Electronic System (SHINES) Conference, Riverside, California, USA, Aug. 2016.
4- Dean's Commendation for Higher Achievement, The University of Queensland, Australia, July 2009.

Publishing Papers:

1- Victor H. Ortiz†, **Mohammed Aldosary**†, Junxue Li, Yadong Xu, Mark I. Lohmann, Pathikumar Sellappan, Yasuhiro Kodera, Javier E. Garay and Jing Shi. ***"Systematic control of strain-induced perpendicular magnetic anisotropy in epitaxial europium and terbium iron garnet thin films"***. APL Materials 6, 121113 (2018). [† are co-first authors].

2- Chi Tang, Bin Cheng, **Mohammed Aldosary**, Zhiyong Wang, Zilong Jiang, K. Watanabe, T. Taniguchi, Marc Bockrath, and Jing Shi. ***"Approaching quantum anomalous Hall effect in proximity-coupled YIG/graphene/hBN sandwich structure".*** APL Materials 6, 026401 (2018).

3- M. Evelt, C. Safranski, **Mohammed Aldosary**, V. E. Demidov, I. Barsukov, A. P. Nosov, A. B. Rinkevich, K. Sobotkiewich, Xiaoqin Li, Jing Shi, I. N. Krivorotov & S. O. Demokritov. ***"Spin Hall-induced auto-oscillations in ultrathin YIG grown on Pt"***. Scientific Reports 8, Article number: 1269 (2018). DOI:10.1038/s41598-018-19606-5

4- Aryan Navabi, Cai Chen, Anthony Barra, Mohsen Yazdani, Guoqiang Yu, Mohammad Montazeri, **Mohammed Aldosary**, Junxue Li, Kin Wong, Qi Hu, Jing Shi, Gregory P. Carman, Abdon E. Sepulveda, Pedram Khalili Amiri, and Kang L. Wang. ***"Efficient Excitation of High-Frequency Exchange-Dominated Spin Waves in Periodic Ferromagnetic Structures"***. Physical Review Applied 7, 034027 (2017).

5- Junxue Li, Guoqiang Yu, Chi Tang, Yizhou Liu, Zhong Shi, Yawen Liu, Aryan Navabi, **Mohammed Aldosary**, Qiming Shao, Kang L. Wang, Roger Lake,and Jing Shi. ***"Deficiency of the bulk spin Hall effect model for spin-orbit torques in magnetic-insulator/heavy-metal heterostructures"***. Physical Review B, Rapid communications, **95**, 241305(R) (2017).

6- **Mohammed Aldosary**, Junxue Li, Chi Tang, Yadong Xu, Jian-Guo Zheng, Krassimir N. Bozhilov, and Jing Shi. ***"Platinum/yttrium iron garnet inverted structures for spin current transport"***. Applied Physics Letters 108, 242401 (2016). [Selected as an APL Editor's Pick].

7- Junxue Li, Yadong Xu, **Mohammed Aldosary**, Chi Tang, Zhisheng Lin, Shufeng Zhang, Roger Lake and Jing Shi. ***"Observation of magnon-mediated current drag in Pt/yttrium iron garnet/Pt(Ta) trilayers"***. Nature communications 7, 10858, (2016).

8- Chi Tang, **Mohammed Aldosary**, Zilong Jiang, Houchen Chang, Benjamin Madon, Kyle Chan, Mingzhong Wu, Javier E. Garay, and Jing Shi. ***"Exquisite growth control and magnetic properties of yttrium iron garnet thin films"***.Applied Physics Letters 108, 102403 (2016).

Conference Talks:

1- C Warren, P Sellappan, **M. Aldosary**, Y Kodera, J Shi, J Garay. "***Synthesis and ferrimagnetic properties of*** $Y_{3(1-x)}Tm_{3x}Fe_5O_{12}$ ***powders''.*** Proc. SPIE 10732, Spintronics XI, 107320G, San Diego, California, United States, September 2018.

2- J. Li; Y. Xu; **M. Aldosary**; C. Tang; Z. Lin; S. Zhang; R. Lake; J. Shi***. "Observation of Magnon-mediated Current Drag in Pt/Yttrium Iron Garnet/Pt(Ta) Trilayers".*** Magnetism and Magnetic Materials (MMM) Conference, Pittsburgh, Pennsylvania, United States, Nov. 2017.

3- Junxue Li, Guoqiang Yu, Chi Tang, Yizhou Liu, Zhong Shi, Yawen Liu, Aryan Navabi, **Mohammed Aldosary**, Qiming Shao, Kang L. Wang, Roger Lake and Jing Shi. "***Spin-orbit torques in magnetic insulator/heavy metal heterostructure''.*** American Physical Society (APS), March meeting, New Orleans, Louisiana, United States, 2017.

4- **Mohammed Aldosary**, Chi Tang, Junxue Li, Yadong Xu and Jing Shi. "***Growth of high-quality inverted yttrium iron garnet/Pt bilayer structures''.*** 13th Joint MMM-Intermag, San Diego, California, United States, January 2016.

5- **Mohammed Aldosary**, Junxue Li, Chi Tang, Yadong Xu and Jing Shi. "***Growth and properties of High-quality metal/ yttrium iron garnet/metal sandwich structures''.*** American Physical Society (APS), March meeting, Baltimore, Maryland, United States, 2016.

6- Junxue Li, Yadong Xu, **Mohammed Aldosary**, Chi Tang, Zhisheng Lin, Shufeng Zhang,Roger Lake and Jing Shi.**"** ***Spin current valve effect in normal metal/magnetic insulator/normal metal sandwiches''.*** American Physical Society (APS), March meeting, Baltimore, Maryland, United States, 2016.

5- Chi Tang, Chi Tang, Bin Cheng, Zhiyong Wang, Zilong Jiang, **Mohammed Aldosary,** Yafis Barlas, Marc Bockrath, T. Taniguchi, K. Watanabe, and Jing Shi." ***Nonlinear Hall effect in h-BN/graphene on ferri-magnetic substrates"***. American Physical Society (APS), March meeting, San Antonio, Texas, United States, 2015.

Conference Posters:

1- Victor H. Ortiz, **Mohammed Aldosary**, Junxue Li, Yawen Liu, Pathikumar Sellappan, Javier Garay and Jing Shi. ***"Strain induced perpendicular magnetic anisotropy in epitaxial europium iron garnet thin films"***. American Physical Society (APS), March meeting, Los Angeles, California, USA, 2018.

2- Maxwell Grossnickle, **Mohammed Aldosary**, Junxue Li, Mark Lohmann, Jing Shi and Nathaniel Gabo. ***"Data-Intensive Spatial Mapping of the Longitudinal Spin Seebeck Effect in Normal Metal/Magnetic Insulator Devices"***. American Physical Society (APS), March meeting, Los Angeles, California, USA, 2018.

3- Aryan Navabi, Cai Chen, Anthony Barra, Mohsen Yazdani, Guoqiang Yu, **Mohammed Aldosary**, Junxue Li, Mohammad Montazeri, Kin Wong, Jing Shi, Greg Carman, Abdon Sepulveda, Pedram Khalili Amiri and Kang Wang. ***"Efficient Excitation of Perpendicular Standing Spin-Waves in Undulating CoFeB Films"***. American Physical Society (APS), March meeting, Los Angeles, California, USA, 2018.

4- Junxue Li, Mark Lohmann, **Mohammed Aldosary**, Weimin Zhou, Peng Wei and Jing Shi. ***"Epitaxial growth of uniaxial antiferromagnetic*** FeF_2 ***thin films"***. American Physical Society (APS), March meeting, Los Angeles, California, USA, 2018.

5- **Mohammed Aldosary**, Bassim Arkook, Junxue Li, Victor Ortiz, Zhong Shi, Igor Barsukov and Jing Shi.***"Interfacial spin transport in YIG/Pt bilayers with variable Pt resistivity".*** Magnetism and Magnetic Materials (MMM) Conference, Pittsburgh, Pennsylvania, USA, Nov. 2017.

6- Victor H. Ortiz, Yadong Xu, **Mohammed Aldosary**, Cui-Zu Chang and Jing Shi. ***"Gate-tuned Longitudinal Spin Seebeck Effect in Topological Insulators"***. American Physical Society (APS), March meeting, New Orleans, Louisiana, USA, 2017.

7- J. Li; Y. Xu; **M. Aldosary**; C. Tang; Z. Lin; S. Zhang; R. Lake; J. Shi***. "Observation of Magnon-mediated Current Drag in Pt/Yttrium Iron Garnet/Pt(Ta) Trilayers".*** Magnetism and Magnetic Materials (MMM) Conference, Pittsburgh, Pennsylvania, USA, Nov. 2017.

8- Junxue Li, Guoqiang Yu, Chi Tang, Yizhou Liu, Zhong Shi, Yawen Liu, Aryan Navabi, **Mohammed Aldosary**, Qiming Shao, Kang L. Wang, Roger Lake and Jing Shi."***Spin-orbit torques in magnetic insulator/heavy metal heterostructure''.*** American Physical Society (APS), March meeting, New Orleans, Louisiana, USA, 2017.

9- **Mohammed Aldosary**, Chi Tang, Junxue Li, Yadong Xu, Yawen Liu, Pathi Sellappan, Javier E. Garay, Jing Shi. ***"Garnet-Based Magnetic Insulator Films and Heterostructures".*** Spin and Heat in Nanoscale Electronic System (SHINES) symposium, Riverside, California, USA, August 2016.

10- Junxue Li, Yadong Xu, **Mohammed Aldosary**, Chi Tang, Zhisheng Lin, Shufeng Zhang,Roger Lake and Jing Shi.**"** ***Spin current valve effect in normal metal/magnetic insulator/normal metal sandwiches''.*** American Physical Society (APS), March meeting, Baltimore, Maryland, USA, 2016.

11- J. X. Li, Y. D. Xu, **M. Aldosary**, G. Yin, Y. Barlas, S. S. Su, C. Tang, R. Lake, S. F. Zhang and J. Shi. ***"Magnon mediated electric current drag effect in normal metal/magnetic insulator/normal metal sandwich structures".*** SHINES Energy Frontier Research Center Conference, Long beach, California, USA, Sep. 2015.

12- C. Tang, Z. L. Jiang, Z. Y. Wang, **M. Aldosary**, C.-Z. Chang, P. Wei, M. R. Masir, Y. Balars, J. S. Moodera, A. MacDonald, and J. Shi. "**Proximity-Induced ferromagnetism in graphene and topological insulators interfaced with YIG".** 11th Annual International Nanotechnology Conference on Communication and Cooperation, Fukuoka, Japan, May 2015.

13- Chi Tang, Bin Cheng, Zhiyong Wang, Zilong Jiang, **Mohammed Aldosary,** Yafis Barlas, Marc Bockrath, T. Taniguchi, K. Watanabe, and Jing Shi." ***Nonlinear Hall effect in h-BN/graphene on ferri-magnetic substrates"***. American Physical Society (APS), March meeting, San Antonio, Texas, USA, 2015.

Patent:

Jing Shi, Junxue Li, Yadong Xu, **Mohammed Aldosary**, Chi Tang and Roger Lake***. "Spin Current Devices and Methods of Fabrication Thereof"***. *US Patent* 20,170,104,150.