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EDUCATION

- ◆ 2009 – 2015 Department of Physics, Sogang University, Seoul, Korea (Intergrated Ph.D)
- ◆ 2004 – 2009 Department of Physics, Sogang University, Seoul, Korea (Bachelor)

THESIS

“The studies on the physical properties of gapless semiconductor material Pb(Pd,Tr)O₂ (Tr = Mn, Co, Cu, Zn).”

WORK EXPERIENCE

- ◆ 2015-present Department of Physics, Johannes-Gutenberg University Mainz, Mainz, Germany

EXPERIMENTAL EXPERIENCES & SKILLS

- ◆ Transport setup for SQUID-VSM (-70kOe<H<70kOe, 2K<T<400K)
 - ❖ Hardware setup and program for measurement using macros of multi-vu and LabVIEW
- ◆ 3D magnet probe station for device magneto-transport measurements (H_x, H_y, H_z<1.2kOe, 300K<T<500K)
 - ❖ Hardware setup and program for measurement using LabVIEW
- ◆ Low temperature transport measurement setup (H<12kOe, 3K<T<400K)
 - ❖ Hardware setup and program for measurement using LabVIEW
- ◆ Thermoelectric power measurement system (H<12kOe, 3K<T<400K)
 - ❖ Hardware setup and program for measurement using LabVIEW
- ◆ Magneto optical Kerr effect imaging system (H<1kOe, 3K<T<300K)
 - ❖ Hardware setup and program for measurement using LabVIEW W
- ◆ Single crystal growth: Bridgeman method, flux method, solid state sintering
- ◆ Skills
 - ❖ Setup and operation of all the hardwares listed above
 - ❖ Skilled in experiments under extreme environments especially low T, high H, high T, and high P
 - ❖ Skillful in building and modifying programs with LabVIEW

AWARDS

- ◆ **Best Poster Awards**
 - ❖ Superparamagnetism of Cu₂Se nanoparticles, Nano Korea 2011
 - ❖ Unexpected magnetism of embedded TbN nano-clusters in Co thin films, IEEE nano 2010
- ◆ **Best oral presentation awards**
 - ❖ ER & MR effect in pure PbPdO₂, 2010 KPS fall meeting

SCHOLARSHIP

- ◆ Hi-Seoul fellowship
- ◆ Marie Curie Fellowship

PUBLICATIONS (SCI)

◆ 2018

1. Chiral magnetic interlayer coupling in synthetic antiferromagnets, D. S. Han, **K. Lee**, J.-P. Hanke, Y. Mokrousov, W. Yoo, T. W. Kim, R. Lavijzen, C.-Y. You, H. JM Swagten, M. H. Jung, M. Kläui, submitted: arXiv:1809.01080
2. Evidence for phonon skew scattering in the spin Hall effect of platinum, G. V. Karnad, C. Gorini, **K. Lee**, T. Schulz, R. Lo Conte, A. W. J. Wells, D.-S. Han, K. Shahbazi, J.-S. Kim, T. A. Moore, H. J. M. Swagten, U. Eckern, R. Raimondi, and M. Kläui, Phys. Rev. B **97**, 100405(R)

◆ 2017

1. Exploring High-Energy Li-I(r)on Batteries and Capacitors with Conversion-Type Fe_3O_4 -rGO as the Negative Electrode, H. K. Kim, V. Aravindan, H.-K. Roh, **K. Lee**, M. H. Jung, S. Madhavi, K. C. Roh, and K. B. Kim, ChemElectroChem **4**, 2626
2. Investigation of the Dzyaloshinskii-Moriya interaction and room temperature skyrmions in W/CoFeB/MgO thin films and microwires, S. Jaiswal, K. Litzius, I. Lemesh, F. Büttner, S. Finizio, J. Raabe, M. Weigand, **K. Lee**, J. Langer, B. Ocker, G. Jakob, G. S. D. Beach, and M. Kläui, Appl. Phys. Lett. **111**, 022409
3. Role of top and bottom interfaces of a Pt/Co/AlO_x system in Dzyaloshinskii-Moriya interaction, interface perpendicular magnetic anisotropy, and magneto-optical Kerr effect, N. Kim, J. Cho, J. Jung, D. Han, Y. Yin, J. Kim, H. Swagten, **K. Lee**, M. Jung, and C. You, AIP Adv. **7**, 035213
4. Ferromagnetic layer thickness dependence of the Dzyaloshinskii-Moriya interaction and spin-orbit torques in Pt\Co\AlO_x, R. L. Conte, G. Karnad, E. Martinez, **K. Lee**, N-H Kim, D-S Han, J-S Kim, S. Prenzel, T. Schulz, C-Y You, H. JM Swagten, and M. Kläui, AIP Adv. **7**, 065317
5. Effective field analysis using the full angular spin-orbit torque magnetometry dependence, T. Schulz, **K. Lee**, B. Krüger, R. L. Conte, G. V Karnad, K. Garcia, L. Vila, B. Ocker, D. Ravelosona, and M. Kläui, Phys. Rev. B **95**, 224409

◆ 2016

1. Thickness Dependence Magnetization in Laser Ablated Ni–Cu–Zn Ferrite Nanostructured Thin Films, AT Raghavender, N. H. Hong, **K. Lee**, M. H. Jung, J. Nanosci. Nanotechnol. **16**, 811

◆ 2015

1. Magnetic versus nonmagnetic ion substitution effects in gapless semiconductor PbPdO₂, **K. Lee**, S. Choo, and M. H. Jung, Appl. Phys. Lett. **106**, 072406
2. Perpendicular magnetic anisotropy of amorphous [CoSiB/Pt]_N thin films, T. W. Kim, Y. H. Choi, **K. J. Lee**, J. B. Yoon, J. H. Cho, C.-Y. You, and M. H. Jung, J. Appl. Phys. **117**, 17B502
3. Spin-orbit torques for current parallel and perpendicular to a domain wall T. Schulz, O. Alejos, E. Martinez, K. MD Hals, K. Garcia, L. Vila, **K. Lee**, R. Lo Conte, G. Karnad, S. Moretti, B. Ocker, D. Ravelosona, A. Brataas, and M. Kläui, Appl. Phys. Lett. **107**, 122405
4. Oscillatory Interlayer Exchange Coupling in Amorphous CoSiB/Pt/CoSiB Structure, Y. Choi, **K. Lee**, Y. Kim, S. Kang, T. Kim, C.-Y. You, and M. H. Jung, IEEE Trans. Magn. **51**, 1
5. Exchange bias effect determined by anisotropic magnetoresistance in $\text{Co}_x\text{Ni}_{1-x}\text{O}/\text{Ni}_{0.8}\text{Fe}_{0.2}$ bilayer system, W. Yoo, S. Choo, **K. Lee**, S. Jo, C.-Y. You, J. Hong, and M. H. Jung, IEEE Trans. Magn. **51**, 1
6. Polarity-tunable magnetic tunnel junctions based on ferromagnetism at oxide heterointerfaces, T. Ngo, J. Chang, **K. Lee**, S. Han, J. Lee, Y. Kim, M. H. Jung, Y. Doh, M. Choi, J. Song, and J. Kim, Nat. Commun. **6** 8035
7. Ferromagnetism of Single-Crystalline Cu₂O Induced through Poly (N-vinyl-2-pyrrolidone) Interaction Triggering d-Orbital Alteration, D. Kim, C. Kim, J. Sohn, **K. Lee**, M. H. Jung, M. Kim, and Y. Kang, J.

Curriculum Vitae

- Phys. Chem. C, **119**, 13350
8. Magnetic transition to antiferromagnetic phase in gadolinium substituted topological insulator Bi₂Te₃, J. Kim, **K. Lee**, T. Takabatake, H. Kim, M. Kim, and M. H. Jung, Sci. Rep. **5**, 10309
 9. Crossover between weak anti-localization and weak localization by Co doping and annealing in gapless PbPdO₂ and spin gapless Co-doped PbPdO₂, S. Choo, **K. Lee**, S. Park, J. Yoon, G. Park, C.-Y. You, M. H. Jung, Appl. Phys. Lett. **106**, 172404
- ◆ 2014
1. Spin-orbit torque in a bulk perpendicular magnetic anisotropy Pd/FePd/MgO system, H. R. Lee, **K. J. Lee**, J. Cho, Y. H. Choi, C.-Y. You, M. H. Jung, F. Bonell, Y. Shiota, S. Miwa, and Y. Suzuki, Sci. Rep. **4**, 6548
 2. Crossover between two-dimensional surface state and three-dimensional bulk phase in Fe-doped Bi₂Te₃, N. H. Jo, **K. J. Lee**, J. S. Kim, J. W. Jang, J. H. Kim, and M. H. Jung, Appl. Phys. Lett. **104**, 252413
 3. Valence states and electronic structures of Co and Mn substituted spin gapless semiconductor PbPdO₂, D. H. Kim, J. Hwang, E. Lee, **K. J. Lee**, S. M. Choo, M. H. Jung, J. Baik, H. J. Shin, B. Kim, K. Kim, B. I. Min, and J.-S. Kang, Appl. Phys. Lett. **104**, 022411
 4. Substitution effect on the magnetic and transport properties of CeNi_{0.8-x}Mn_xBi₂, S. W. Kim, **K. J. Lee**, D. T. Adroja, F. Demmel, J. W. Taylor, and M. H. Jung, J. Appl. Phys. **116**, 073901
 5. Field-induced domain wall motion of amorphous [CoSiB/Pt]_N multilayers with perpendicular anisotropy, Y. H. Choi, **K. J. Lee**, J. B. Yoon, J. H. Cho, C.-Y. You, T. W. Kim, and M. H. Jung, J. Appl. Phys. **115**, 183901
 6. Fabrication and temperature-dependent magnetic properties of one-dimensional multilayer Au–Ni–Au–Ni–Au nanowires, S. Ishrat, K. Maaz, **K. J. Lee**, M. H. Jung, and G. H. Kim, J. Sol. State Chem. **210**, 116
- ◆ 2013
1. Tuning of magnetic and transport properties in Bi₂Te₃ by divalent Fe doping, N. H. Jo, **K. J. Lee**, C. M. Kim, K. Okamoto, A. Kimura, K. Miyamoto, T. Okuda, Y. K. Kim, Z. Lee, T. Onimaru, T. Takabatake, and M. H. Jung, Phys. Rev. B **87**, 201105(R)(1-5)
 2. Perpendicular magnetic anisotropic characteristics of amorphous [CoSiB/Pt]_N multilayers, E. H. M. van der Heijden, **K. J. Lee**, Y. H. Choi, T. W. Kim, H. J. M. Swagten, C.-Y. You, and M. H. Jung, Appl. Phys. Lett. **102**, 102410
 3. Nickel segment-length dependent magnetic properties of Au-Ni-Au nanowires at low temperature fabricated by electrochemical deposition, S. Ishrat, K. Maaz, **K. J. Lee**, M. H. Jung, G. H. Kim, J. Solid State Chem. **199**, 160
 4. Ultra-small, uniform, and single bcc-phased Fe_xCo_{1-x}/graphitic shell nanocrystals for T1 magnetic resonance imaging contrast agents, I. A. Choi, Y. Li, M. Pal, J.-H. Cho, **K. J. Lee**, M. H. Jung, C. Lee, W. S. Seo, Chem.-Asian J. **8**, 290
 5. Hole mediated ferromagnetism in Cu-doped ZnO thin films on GaAs substrate, A.P. Singh, B.-G. Park, I-J. Lee, **K. J. Lee**, M. H. Jung, J. Kim, J.-Y. Kim, J. Magn. Magn. Mater. **328**, 58
 6. Nano-ilmenite FeTiO₃: synthesis and characterization, A.T. Raghavender, N. H. Hong, **K. J. Lee**, M. H. Jung, Z. Skoko, M. Vasilevskiy, M.F. Cerqueira, A.P. Samantilleke, J. Magn. Magn. Mater. **331**, 129
 7. Annealing effect on surface morphology and electrical transport of PbPdO₂ and Pb(Pd,Co)O₂, S. M. Choo, **K. J. Lee**, S. M. Park, G. S. Park, and M. H. Jung, J. Appl. Phys. **113**, 014904
- ◆ 2012
1. Fabrication and temperature-dependent magnetic properties of one-dimensional embedded nickel segment in gold nanowires, S. Ishrat, K. Maaz, **K. J. Lee**, M. H. Jung, G. H. Kim, J. Alloy Compd. **541**, 483
 2. Surface-induced magnetism in Au particles/clusters, A.T. Raghavender, N. H. Hong, B. S. Swain, M-H. Jung, **K. J. Lee**, D-S. Lee, Mat. Lett. **87**, 169
 3. Hierarchical NiO hollow microspheres: electrochemical and magnetic properties, H. G. Cha, J. H. Sohn, Y. Park, **K. J. Lee**, M. H. Jung, J. Lee, W. Shin, and Y. S. Kang, RSC adv. **2**, 9786
 4. Simple tuning of carrier type in topological insulator Bi₂Se₃ by Mn doping, Y. H. Choi, N. H. Jo, **K. J. Lee**, H. W. Lee, Y. H. Jo, J. Kajino, T. Takabatake, K.-T. Ko, J.-H. Park, and M. H. Jung, Appl. Phys. Lett. **101**, 152103

Curriculum Vitae

5. Superparamagnetism of Cu₂Se nanoparticles, S. W. Kim, **K. J. Lee**, M. H. Jung, Y. Li, and W. S. Seo, *J. Nanosci. Nanotechnol.* **12**, 5880
 6. Vertical cobalt dendrite array films: electrochemical deposition and characterization, glucose oxidation and magnetic properties, J. Y. Zheng, Z. L. Quan, G. Song, C. W. Kim, H. G. Cha, T. W. Kim, W. Shin, **K. J. Lee**, M. H. Jung, Y. S. Kang, *J. Mater. Chem.* **22**, 12296
 7. Effect of annealing conditions on structural and magnetic properties of laser ablated copper ferrite thin films, A. T. Raghavender, N. H. Hong, C. Park, M. H. Jung, **K. J. Lee**, D. Lee, *J. Magn. Magn. Mater.* **324**, 1814
 8. Effect of temperature on the magnetic characteristics of Ni_{0.5}Co_{0.5}Fe₂O₄ nanoparticles, K. Maaz, S. Karim, **K. J. Lee**, M. H. Jung, G. H. Kim, *Mater. Chem. Phys.* **133**, 1006
 9. One-dimensional ferromagnetic dendritic iron wire array growth by facile electrochemical deposition, R. Qui, J. Y. Zheng, H. G. Cha, M. H. Jung, **K. J. Lee**, Y. S. Kang, *Nanoscale* **4**, 1565
 10. A reconstruction of cubic rs-ZnO on MgO (200) substrate through (100) plane of w-ZnO:rs-ZnO for transparent electronic application, S. M. Bobade, S. M. Choo, **K. J. Lee**, S. Park, G. Park, K. Shin, and M. H. Jung, *Appl. Phys. Lett.* **100**, 072102
- ◆ 2011
1. Single-crystal like mesoporous ZnO:Mn²⁺ nanorings of high optoelectronic quality formed by self-assembly of nanoparticles in an ultrasonic hydrolysis process, U. Pal, C. W. Kim, **K. J. Lee**, M. H. Jung, and Y. S. Kang, *Nanoscale* **3**, 4962
 2. Emergence of room-temperature magnetic ordering in artificially Fabricated ordered-double-perovskite Sr₂FeRuO₆, J. W. Chang, **K. J. Lee**, M. H. Jung, J. H. Kwon, M. Y. Kim, S. K. Kim, *Chem. Mater.* **23**, 2693
 3. Highly stable and magnetically recyclable mesoporous silica spheres embedded with FeCo/graphitic shell nanocrystals for supported catalysts, Yan Le, Y. J. Kim, A. Y. Kim, **K. J. Lee**, M. H. Jung, N. H. Hur, K. H. Park, and W. S. Seo, *Chem. Mater.* **23**, 5398
 4. Superconducting properties of a stoichiometric FeSe compound and two anomalous features in the normal state, Y. J. Song, J. B. Hong, B. H. Min, Y. S. Kwon, **K. J. Lee**, M. H. Jung and J. S. Rhyee, *J. Korean Phys. Soc.* **59**, 312
 5. Single-crystalline porous hematite nanorods: photocatalytic and magnetic properties, H. G. Cha, S. J. Kim, **K. J. Lee**, M. H. Jung, and Y. S. Kang, *J. Phys. Chem. C*, **115**, 19129
 6. Interplay of the superconductivity and magnetism in Eu_{0.7}Na_{0.3}Fe₂As_{1.4}P_{0.6}, Y. R. Jang, J. B. Hong, B. H. Min, M. A. Jung, Y. Y. Song, H. J. Oh, **K. J. Lee**, M. H. Jung, *Supercond. Sci. Tech.* **24**, 85017
 7. Thickness dependent magnetic properties of BiFeO₃ thin films prepared by pulsed laser deposition, A.T. Raghavender, N. H. Hong, C. Park, M. H. Jung, **K. J. Lee**, D. Lee, *Mat. Lett.* **65**, 2786
 8. Transport and magnetic properties of Cr-, Fe-, Cu-doped topological insulators, Y. H. Choi, N. H. Jo, **K. J. Lee**, J. B. Yoon, C. Y. You, M. H. Jung, *J. Appl. Phys.* **109**, 07E312
 9. Magnetic properties of Mn and Co doped PbPdO₂, **K. J. Lee**, S. M. Choo, Y. Saiga, T. Takabatake, M. H. Jung, *J. Appl. Phys.* **109**, 07C316
 10. Magnetocaloric effect in La(Fe_{0.89}Si_{0.11})₁₃ irradiated by protons, S. J. Kim, **K. J. Lee**, M. H. Jung, H. J. Oh, Y. S. Kwon, *J. Magn. Magn. Mater.* **323**, 1094
 11. Interface Effect of Magnetic Properties in Ni Nanoparticles with a hcp Core and fcc Shell Structure, S. M. Choo, **K. J. Lee**, Y. Jo, S. M. Yoon, J. Y. Choi, J. Y. Kim, J. H. Park, K. J. Lee, J. H. Lee, and M. H. Jung, *J. Nanosci. Nanotechnol.* **11**, 6126
 12. Electron tunneling spectroscopy of SmB₆ studied by in situ nano-break-junction method, H. W. Lee, **K. J. Lee**, S. Choo, N. Jo, and M. H. Jung, *J. Nanosci. Nanotechnol.* **11**, 6368
 13. Transition of the magnetotransport in a Co-TbN, System, T. Kim, **K. J. Lee**, J. Yoon, C.-Y. You, M. H. Jung, *J. Nanosci. Nanotechnol.* **11**, 6245
 14. Small anisotropy of the lower critical field and the s±-wave two-gap feature in single-crystal LiFeAs, Y. J. Song, J. S. Ghim, J. H. Yoon, **K. J. Lee**, M. H. Jung, H.-S. Ji, J. H. Shim, Y. Bang and Y. S. Kwon, *EPL* **94**, 57008
- ◆ 2010

Curriculum Vitae

1. Magnetic properties of gapless semiconductors: PbPdO₂ and PbPd_{0.9}Co_{0.1}O₂, **K. J. Lee**, S. M. Choo, J. B. Yoon, K. M. Song, Y. Saiga, C.-Y. You, N. Hur, S. I. Lee, T. Takabatake, M. H. Jung, *J. Appl. Phys.* **107**, 09C306

◆ 2009

1. Magnetic phase coupled to an electric memory state in d(0) oxide ZrO₂ films, Y. Jo, I. R. Hwang, B. H. Park, **K. J. Lee**, S. I. Lee, M. H. Jung, *Appl. Phys. Lett.* **95**, 263504

INTERNATIONAL CONFERENCES

◆ 2018

1. Anisotropic spin-orbit torques in single crystal IrMn/Co/Pt and Pt/Co/Pt thin film multilayers, 2018 JEMS, Mainz, Germany

◆ 2016

1. Determining spin-orbit torques easily: new domain wall depinning analysis scheme in comparison to spin torque magnetometry, 2016 MMM, New Orleans, United States
2. Determining spin-orbit torques by spin torque magnetometry and domain wall depinning, 2016 JEMS, Glasgow, United Kingdom

◆ 2013

1. Doping effect of Mn and Co ions in PbPdO₂, 2013 APS March meeting, Baltimore, United States

◆ 2012

1. Coexistence of superconductivity and antiferromagnetism in CeNi_{0.8}Bi₂, The 19th international conference on magnetism, Busan, Korea
2. Magnetic characteristics of amorphous [CoSiB/Pt]_N multilayers, The 19th international conference on magnetism, Busan, Korea
3. Magnetic doping effect on physical properties of PbPdO₂, The 19th international conference on magnetism, Busan, Korea
4. Reduction of weak localization strength on controlling oxygen defects by ex-situ annealing, The 19th international conference on magnetism, Busan, Korea
5. Tuning of carrier type in Mn-doped Bi₂Se₃, The 19th international conference on magnetism, Busan, Korea
6. Magnetic properties of rare earth doped Bi₂Te₃, The 19th international conference on magnetism, Busan, Korea
7. Iron doping effect in topological insulator Bi₂Te₃, The 19th international conference on magnetism, Busan, Korea
8. Tuning of topological states in Bi₂Te₃ with magnetic impurities, Eurasia-Pacific Conference on Strongly Correlated Electrons, Turkey

◆ 2011

1. Superparamagnetism of Cu₂Se nanoparticles, The 9th international nanotech symposium and exhibition in Korea, Ilsan, Korea
2. Change of nanoscale grain sizes in Pb-based thin films by ex-situ annealing, The 9th international nanotech symposium and exhibition in Korea, Ilsan, Korea
3. Ex-situ annealing effect of PbPdO₂ thin films under Pb-rich atmosphere, 2011 ICAMD, Jeju, Korea
4. Tuning of physical properties in PbPdO₂ by magnetic doping, 2011 ICAMD, Jeju, Korea
5. Small amount magnetic ion doping effect in topological insulator : Bi₂Te₃, 2011 ICAMD, Jeju, Korea
6. Transport and magnetic properties of Mn-doped Bi₂Se₃, 2011 ICAMD, Jeju, Korea
7. Aging effect and magnetic properties of Cu₂Se nanoparticles, 2011 ICAMD, Jeju, Korea

◆ 2010

1. Two different nanoscale magnetism in Cu₂O and CuO nanowires, 11th MMM/Intermag conference, Washington DC, United States
2. Magnetic properties of gapless semiconductors: PbPdO₂ and PbPd_{0.9}Co_{0.1}O₂, 11th MMM/Intermag conference, Washington DC, United States

Curriculum Vitae

3. Bias dependence of transverse and longitudinal spin-transfer torque in symmetric MgO-based magnetic tunnel junctions, 2010 ISAMMA, Japan
4. Electroresistance and magnetoresistance effects in undoped PbPdO₂ thin films, 2010 ISAMMA, Japan
5. Electron tunneling spectroscopy of SmB₆ studied by in situ nano-break-junction method, 2010 IEEE nano Korea symposium, Seoul, Korea
6. Unexpected magnetism of embedded TbN nano-clusters in Co thin films, 2010 IEEE nano Korea symposium, Seoul, Korea
7. Interface effect of Ni nanoparticles with a hcp-fcc core shell structure, 2010 IEEE nano Korea symposium, Seoul, Korea
8. Proposal for Spin Hall Effect in Co-doped PbPdO₂, ICAUMS2010, Jeju, Korea
9. Spin gap studies on break-junction tunneling spectroscopy of SmB₆, ICAUMS2010, Jeju, Korea
10. Annealing effect on the physical properties of Co-doped PbPdO₂, ICAUMS2010, Jeju, Korea
11. The Effect of Co, Mn Doping in PbPdO₂, ICAUMS2010, Jeju, Korea
12. Spin-dependent transport in granular TbN-Co films, ICAUMS2010, Jeju, Korea
13. Magnetic ion doping effects on topological insulator Bi₂Se₃, ICAUMS2010, Jeju, Korea
14. Ordered double Perovskite Sr₂FeRuO₆ grown by alternating deposition of SrRuO₃ and SrFeO₃, ICAUMS2010, Jeju, Korea
15. Mn and Co doping effect on gapless semiconductor PbPdO₂, 55th annual conference on magnetism and magnetic materials, Atlanta, United States
16. Magnetic properties of Cr-, Fe-, Cu-doped topological insulators, 55th annual conference on magnetism and magnetic materials, Atlanta, United States