

Curriculum Vitae

Phark, Soo-hyon

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EDUCATIONS

- 1990.03 – 1998.02 **B. S.**, Department of Physics, Chonnam Nat'l Univ., Korea
1998.03 – 2000.02 **M. S.**, School of Physics, Seoul Nat'l Univ., Korea
2000.03 – 2006.08 **Ph. D.**, School of Physics, Seoul Nat'l Univ., Korea
Title of thesis: "Study on the powders and films of sulfur-terminated Mn12 single-molecule magnets", (supervisor: Prof. Zheong G. Khim)

CAREERS: RESEARCH

- 2006.09 – 2009.02 Postdoc, Department of Physics, Seoul Nat'l Univ.
2009.03 – 2010.02 Research Professor, Department of Physics, Ewha W. Univ.
2010.03 – 2014.08 Postdoc, Max-Planck-Institut für Mikrostrukturphysik, Germany
2014.09 – 2015.08 Research Asso. Professor, CCES, IBS & Physics Dept. Seoul Nat'l Univ.
2015.09 – 2016.09 Research Fellow, Korea Research Institute of Standards and Science
2016.10 – Present Research Fellow, QNS, IBS & Physics Dept. Ewha W. Univ.

CAREERS: TEACHING

- 1999.03 – 2001.02 Teaching Assistant, Seoul Nat'l Univ.
2003.03 – 2008.02 Lecturer, The Catholic Univ. of Korea
(Undergraduate Course: Solid State Electronic Devices; Computational Physics; Electromagnetism)
2004.03 – 2006.06 Lecturer, Sejong University (Fundamental Physics & Experiments)

Curriculum Vitae

2009.09 – 2009.12 Ewha Womans Univ. (Graduate Course: Advanced Physics Experiment)

CAREERS: MISC.

1992.02 – 1994.09 Military service in the Navy of Korea

2002.07 – 2003.02 Visiting student at The Univ. of Texas at Austin, USA

TECHNICAL EXPERIENCES

1. Instrumentation

- a. Design/Construction of an ultra-high vacuum low temperature scanning tunneling/probe microscope [Zheong G. Khim's group at Seoul Nat'l Univ.]
- b. Construction of a low temperature magnetic force microscope [Alex de Lozanne's group at The Univ. of Texas at Austin]
- c. Construction of an ultra-high vacuum 3He-cooled scanning tunneling microscope with 14 T magnet [CCES, IBS (director: Prof. Tae Won Noh) at Seoul Nat'l Univ.]
- d. Design of an ultrahigh vacuum spin-polarized scanning electron microscopy [KRISS]

2. Sample Preparation/Fabrication

- a. Atomically flat metal film and nanoisland growths by electron-beam evaporation
- b. Oxide thin film growths using pulsed laser deposition (PLD) equipped with RHEED
- c. Graphene on metal surface by CVD

3. Characterization Technique

- a. UHV-LT spin-polarized STM/S (7 K, 7 T)
- b. UHV-VT STM/AFM (Omicron GmbH)
- c. Ambient AFM, MFM, EFM, and conductive-AFM
- d. X-ray Photoemission Spectroscopy (PSP vacuum)

RESEARCH TOPICS

1. Single Molecule Magnet: Seoul National Univ. (PhD thesis)

- a. Magnetism of Mn₁₂-SMM functionalized by Sulfur-terminated ligands.
- b. Structural/electrical properties of Mn₁₂-SMM on Au(111) using SPM.

2. Ultra-thin Oxide Film Grown by Pulsed-laser-deposition: Seoul National Univ.

- a. Characterization of submonolayer NiO/Ag(100) using UHV-VT STM/AFM and XPS.

Curriculum Vitae

- b. Structural/electrical properties of perovskites on SrTiO₃ using UHV-VT SPM and XPS.
- c. Oxygen atoms adsorbed on Ag(100) using UHV-VT STM and *ab initio* calculation.
- 3. Metal-oxide & Metal-semiconductor Interface: Ewha Woman's Univ.**
 - a. Chemical composition studies on Pt/NiO and Ag/NiO using XPS.
 - b. Structural/electrical properties of Pt/GaN junction using conductive-AFM.
- 4. Graphene: Max-Planck-Institut für Mikrostrukturphysik**
 - a. Structural/electronic properties of graphene edges on Ir(111) using low-temp. STM.
 - b. Quantum confinement phenomena in graphene nanoislands using low-temp. STM.
- 5. Magnetic Nanostructure: Max-Planck-Institut für Mikrostrukturphysik**
 - a. Noncollinear magnetism of Fe nanoislands on Cu(111) using spin-polarized STM.
 - b. Magnetism of collinear-noncollinear spin interface using spin-polarized STM.
 - c. Magnetic interactions of tip & sample in spin-polarized STM.

REFERENCE CONTACTS

- 1. Prof. Zheong G. Khim**
 - a. Dept. Physics & Astronomy, Seoul Nat. Univ. (emeritus)
 - b. Supervisor of Ph.D. thesis
 - c. Contact: (M) +82-10-2448-6604, (email) jnine@snu.ac.kr
- 2. Prof. Tae Won Noh**
 - a. CCES, Institute for Basic Science (Director); Dept. Physics & Astronomy, Seoul Nat. Univ.
 - b. Advisor of Postdoc research
 - c. Contact: (T) +82-2-877-8108, (M) +82-10-2611-6616, (email) twnoh@snu.ac.kr
- 3. Prof. Jürgen Kirschner**
 - a. Max-Planck-Institute of Microstructure Physics (emeritus Director), Halle, Germany
 - b. Advisor of Postdoc research
 - c. Contact: (T) +49-345-5582-655, (email) sekrki@mpi-halle.mpg.de
- 4. Prof. Seok-won Yoon**
 - a. Dept. Physics, The Catholic Univ. of Korea
 - b. Advisor of Ph.D. thesis
 - c. Contact: (T) +82-2-2164-4381, (email) syoon@catholic.ac.kr

Research Achievements

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KEY ACHIEVEMENTS

(*corresponding author)

1. Jeison A. Fischer, Leonid M. Sandratskii*, **Soo-Hyon Phark***, Safia Ouazi, Andre A. Pasa, Dirk Sander, Stuart S. P. Parkin, “Probing the spinor nature of electronic states in nanosize non-collinear magnets”, *Nat. Commun.* 7:13000 (2016).
2. Young J. Chang, **Soo-hyon Phark***, “Direct Nanoscale Analysis of Temperature-Resolved Growth Behaviours of Ultrathin Perovskites on SrTiO₃”, *ACS Nano* 10, 5383-5390 (2016).
3. **S.-H. Phark***, J. A. Fischer, M. Corbetta, D. Sander, K. Nakamura, J. Kirschner, “Reduced dimensionality induced helimagnetism in Iron nanoislands”, *Nat. Commun.* 5:5183 (2014).
4. **Soo-hyon Phark**, J. A. Fischer, M. Corbetta, D. Sander*, J. Kirschner, “Superparamagnetic response of Fe-coated W tips in spin-polarized scanning tunneling microscopy”, *Appl. Phys. Lett.* 103, 032407 (2013).
5. **S.-H. Phark***, J. Borme, A. Vanegas, M. Corbetta, D. Sander, J. Kirschner, “Atomic structures and spectroscopy of graphene edges on Ir(111)”, *Phys. Rev. B* 86, 045442 (2012).
6. **S.-H. Phark***, J. Borme, A. Vanegas, M. Corbetta, D. Sander, J. Kirschner, “Direct observation of electron confinement in epitaxial graphene nanoislands”, *ACS Nano* 5, 8162 (2011).
7. **S.-H. Phark***, Young J. Chang, Tae Won Noh, “Selective growth of perovskite oxides on SrTiO₃(001) by control of surface reconstructions”, *Appl. Phys. Lett.* 98, 161908 (2011).
8. Y. J. Chang, C. H. Kim, **S.-H. Phark**, Y. S. Kim, J. Yu, T. W. Noh*, “Fundamental thickness limit of itinerant ferromagnetic SrRuO₃ thin films”, *Phys. Rev. Lett.* 103, 057201 (2009).
9. **S.-H. Phark***, Young Jun Chang, T. W. Noh, J.-S. Kim, “Initial stages of nickel oxide growth on Ag(001) by pulsed laser deposition”, *Phys. Rev. B* 80, 035426 (2009).
10. **S.-H. Phark**, R. Jung, Y. J. Chang, T. W. Noh, D.-W. Kim*, “Interfacial reactions and resistive switching behaviors of metal/NiO/metal structures”, *Appl. Phys. Lett.* 94, 022906 (2009).

Research Achievements

PUBLICATION LIST

1. Jeison A. Fischer, Leonid M. Sandratskii*, **Soo-Hyon Phark***, Safia Ouazi, Andre A. Pasa, Dirk Sander, Stuart S. P. Parkin, “Probing the spinor nature of electronic states in nanosize non-collinear magnets”, *Nat. Commun.* 7:13000(2016).
2. Young J. Chang, **Soo-hyon Phark***, “Direct Nanoscale Analysis of Temperature-Resolved Growth Behaviours of Ultrathin Perovskites on SrTiO₃”, *ACS Nano* 10, 5383-5390 (2016).
3. Minji Gwon, Ahrum Sohn, Yunae Cho, **Soo-hyon Phark**, Jieun Ko, Youn Sang Kim, Dong-Wook Kim*, “Plasmon-enhanced surface photovoltage of ZnO/Ag Nanogratings”, *Sci. Rep.* 5, 16727 (2015).
4. **Soo-Hyon Phark**, Seoung Chul Chae*, “Initial defect configuration in NiO film for reliable unipolar resistance switching of Pt/NiO/Pt structure”, *J. Phys. D: Appl. Phys.* 48, 155102 (2015).
5. **Soo-Hyon Phark**, Young J. Chang*, “Nucleation and growth of primary nanostructures in SrTiO₃ homoepitaxy”, *Nanoscale Res. Lett.* 10, 80 (2015).
6. Ranju Jung, **Soo-Hyon Phark**, Dong-Wook Kim, Mary Upton, Diego Casa, Thomas Gog, Jungho Kim*, “Indirect probing of defects in unipolar resistive switching NiO_x thin films by Ni K-edge resonant inelastic X-ray scattering”, *Appl. Phys. Express* 8, 021101 (2015).
7. **Soo-hyon Phark***, Jeison A. Fischer, Marco Corbetta, Dirk Sander, Kohji Nakamura, Jürgen Kirschner, “Reduced dimensionality induced helimagnetism in Iron nanoislands”, *Nat. Commun.* 5:5183 doi: 10.1038/ncomms6183 (2014).
8. Dirk Sander*, **Soo-hyon Phark**, Marco Corbetta, Jeison Fischer, Hirofumi Oka, Jürgen Kirschner, “The impact of structural relaxation on spin polarization and magnetization reversal of individual nano structures studied by spin-polarized scanning tunneling microscopy”, *J. Phys.: Condens. Matter (Topical Review)* 26, 394008 (2014).
9. **Soo-hyon Phark**, Jeison A. Fischer, Marco Corbetta, Dirk Sander, Jürgen Kirschner, “Superparamagnetic response of Fe-coated W tips in spin-polarized scanning tunneling microscopy”, *Appl. Phys. Lett.* 103, 032407 (2013).
10. Seolun Yang, H.-K. Park, J.-S. Kim*, **S.-H. Phark**, Young Jun Chang, T. W. Noh, H.-N. Hwang, C.-C. Hwang, H.-D. Kim, “Reduction of charge fluctuation energies in ultrathin NiO films on Ag(001)”, *Surf. Sci.* 616, 12 (2013).

Research Achievements

11. **Soo-hyon Phark***, Jérôme Borme, Augusto León Vanegas, Marco Corbetta, Dirk Sander, Jürgen Kirschner, “Atomic structures and spectroscopy of graphene edges on Ir(111)”, *Phys. Rev. B* 86, 045442 (2012).
12. **Soo-hyon Phark***, Jérôme Borme, Augusto León Vanegas, Marco Corbetta, Dirk Sander, Jürgen Kirschner, “Scanning tunneling spectroscopy of epitaxial graphene nanoisland on Ir(111)”, *Nanoscale Res. Lett.* 7, 255 (2012).
13. Hogyoung Kim*, **Soo-Hyon Phark**, Keun Man Song, Dong-Wook Kim, “Schottky contacts to polar and nonpolar n-type GaN”, *J. Kor. Phys. Soc.* 60, 104 (2012).
14. Hogyoung Kim*, **Soo-Hyon Phark**, Keun Man Song, Dong-Wook Kim, “Electrical characterization of Pt Schottky contacts to a-plane n-type GaN”, *AIP Conf. Proc.* 1399, 923 (2011).
15. **Soo-hyon Phark***, Jérôme Borme, Augusto León Vanegas, Marco Corbetta, Dirk Sander, Jürgen Kirschner, “Direct observation of electron confinement in epitaxial graphene nanoislands”, *ACS Nano* 5, 8162 (2011).
16. **Soo-Hyon Phark**, Hogyoung Kim*, Keun Man Song, Dong-Wook Kim, “Observation of Barrier Inhomogeneity in Pt/*a*-plane n-type GaN Schottky Contacts”, *J. Kor. Phys. Soc.* 58, 1356 (2011).
17. **Soo-Hyon Phark***, Young J. Chang, and Tae Won Noh, “Selective growth of perovskite oxides on SrTiO₃(001) by control of surface reconstructions”, *Appl. Phys. Lett.* 98, 161908 (2011).
18. **Soo-Hyon Phark**, Hogyoung Kim, Keun Man Song, Phil Geun Kang, Heung Soo Shin, Dong-Wook Kim*, “Characterization of Pt/*a*-plane GaN Schottky contacts using conductive atomic force microscopy”, *J. Nanosci. Nanotechnol.* 11, 1413(2011).
19. Haeri Kim, Dong-Wook Kim*, **Soo-Hyon Phark**, “Transport behaviors and nanoscopic resistance profiles of electrically stressed Pt/TiO₂/Ti planar junctions”, *J. Phys. D: Appl. Phys.* 43, 505305(2010).
20. **Soo-Hyon Phark**, Hogyoung Kim*, Keun Man Song, Phil Geun Kang, Heung Soo Shin, Dong-Wook Kim, “Current transport in Pt Schottky contacts to *a*-plane n-type GaN”, *J. Phys. D: Appl. Phys.* 43, 165102 (2010).
21. Sungjoo Lee, **Soo-Hyon Phark**, and Dong-Wook Kim*, “Influences of interface states on the electrical properties of Pt/SrTiO₃ junctions”, *J. Kor. Phys. Soc.* 56, 362 (2010).
22. Young Jun Chang, Choong H. Kim, **S.-H. Phark**, Y. S. Kim, J. Yu, and T. W. Noh*, “Fundamental thickness limit of itinerant ferromagnetic SrRuO₃ thin films”, *Phys. Rev. Lett.* 103, 057201 (2009).

Research Achievements

23. **S. H. Phark***, Young Jun Chang, T. W. Noh, and J.-S. Kim, “Initial stages of nickel oxide growth on Ag(001) by pulsed laser deposition”, *Phys. Rev. B* 80, 035426 (2009).
24. **S. H. Phark**, R. Jung, Y. J. Chang, T. W. Noh, and D.-W. Kim*, “Interfacial reactions and resistive switching behaviors of metal/NiO/metal structures”, *Appl. Phys. Lett.* 94, 022906 (2009).
25. **S. H. Phark**, Z. G. Khim*, and S. Yoon, “Growth of a single layer gold stripe and investigation of the preferable growth direction on reconstructed Au(111) surface using STM”, *Current Appl. Phys.* 8, 822 (2008).
26. Seolun Yang, Shijin Seong, J.-S. Kim*, Hanna Hwang, C.-C. Hwang, Young J. Chang, **Soo-Hyon Phark**, H. G. Min, “XPS study of NiO growth on Ag(100)”, *J. Kor. Vac. Soc.* 16, 311 (2007).
27. **S. H. Phark**, Z. G. Khim, J. M. Lim, J. Kim, and S. Yoon*, “Study on the films of a single-molecule magnet Mn₁₂ modified by the selective insertion of a Sulfur-terminated ligand”, *J. Mag. Mater. Mag.* 310, e483 (2007).
28. Casey E. Israel, Changbae Hyun, Alex de Lozanne*, **Soohyon Phark**, Zheong G. Khim, “Compact variable-temperature magnetic force microscope with optical access and lateral cantilever positioning”, *Rev. Sci. Instrum.* 77, 023704 (2006).
29. B. J. Kim, B. J. Suh*, S. Yoon, **S. H. Phark**, Zheong G. Khim, J. Kim, J. M. Lim, and Y. Do, “Magnetic properties of a Mn₁₂O₁₂(O₂CC₄H₃S)₁₆(H₂O)₄ single-molecule magnet”, *J. Kor. Phys. Soc.* 45, 1593 (2004).
30. **Soohyon Phark**, Zheong G. Khim, B. J. Kim, B. J. Suh, S. Yoon*, J. Kim, J. M. Lim, and Y. Do, “Atomic force microscopy study of Mn₁₂O₁₂(O₂CC₄H₃S)₁₆(H₂O)₄ single-molecule magnet adsorbed on Au surface”, *Jap. J. Appl. Phys.* 43, 8273 (2004).
31. J. S. Yang, D. H. Kim, S. D. Bu, T. W. Noh*, **S. H. Phark**, Z. G. Kim, I. W. Lyo, and S.-J. Oh, “Surface structures of a Co-doped anatase TiO₂ (001) film investigated by scanning tunneling microscopy”, *Appl. Phys. Lett.* 82, 3080 (2003).