Curriculum Vitae

Byungmin Sohn

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Education

Feb. 2021 - Mar. 2015	Ph.D. in Physics, **Seoul National University**, Republic of Korea (Advised by Changyoung Kim)
Feb. 2015 - Mar. 2011	B. S. in Physics and Mathematical Sciences (double major), **Seoul National University**, Republic of Korea

Academic Experience

Present - May 2021	Postdoctoral Associate, **Yale University**, CT, USA (Supervised under Charles Ahn)
Apr. 2021 - Mar. 2021	Postdoctoral Researcher, **Seoul National University**, Republic of Korea (Supervised under Changyoung Kim)

Honors and Awards

Dec. 2022	S-Oil Excellent Thesis Award **S-Oil**
Apr. 2022	Current Applied Physics (CAP) Young Researcher Award **Korean Physical Society**, Spring Meeting
Apr. 2019	Excellence Presentation Award **Korean Physical Society**, Spring Meeting
Oct. 2018	Best Poster Award **Korean Physical Society**, Fall Meeting

Languages

Korean:	Native
English:	Fluent
Chinese:	Basic Knowledge

Military Service

Mar. 2021 - Mar. 2018	Professional Research Personnel @ **Seoul National University**

Utilized experimental techniques

Thin-Film synthesis

Pulsed laser deposition (PLD) method

- Installation and maintenance of PLD systems
- Synthesizing oxide thin films, particularly ultra-thin films

Molecular beam epitaxy (MBE) method

- Designing chalcogenide MBE systems
- Installation and maintenance of remotely controlled MBE systems combined with a synchrotron ARPES at National Synchrotron Light Source-II Beamline 21-ID-1
- Synthesizing oxide heterostructures

Thin-film characterization

Transport property measurement

- Measurements of resistivity, magneto-resistance, and Hall effects
- Manipulating thin-film properties using ionic liquid gating
- Reactive-ion and chemical etching for devices

Atomic structure measurement

- X-ray based techniques such as x-ray diffraction (XRD), x-ray reflectometry (XRR), and reciprocal space mapping (RSM)
- Crystal truncation rod (CTR) measurements at Advanced Photon Source Beamline 33-ID-D
- Coherent Bragg rod analysis (COBRA) of ultra-thin films

Surface measurement

- Measuring electronic diffraction patterns of thin film surface using reflection high-energy electron diffraction (RHEED) and low-energy electron diffraction (LEED)
- Imaging surface topography of thin films with atomic force microscopy (AFM)

Angle-resolved photoemission spectroscopy (ARPES)

- Installation of PLD-MBE-ARPES combined systems at Seoul National University
- Investigating electronic structures with high-resolution/spin-resolved/circular-dichroism ARPES
- ARPES measurements at Advanced Light Source Beamline 4.0.3 and 10.0.1, National Synchrotron Light Source-II Beamline 21-ID-1, and Canadian Light Source Beamline 09ID-1

Research Highlights

Transport and electronic structures induced by topological magnetic structures

- Hump-like Hall effects emergent in ultrathin ferromagnetic films due to noncoplanar magnetic structures[4,8,9]
- Sign-tunable anomalous Hall effects induced by topological magnetic nodal structures in two-dimensional ferromagnetic oxides[11]
- Controlling majority charge carriers through two-dimensional van Hove singularities[17]

Controlling electronic structures in oxide thin films

- Controlling electronic structures in a ruthenate monolayer[12,15]
- Thickness-dependent evolution of electronic structures in ruthenate thin films[14]

Exploring magnetic itinerancy in electronic structures

- Observing spin-dependent magnetic itinerancy in ruthenate electronic structures[13]

Publication list

* These authors contributed equally to the work. † Corresponding authors

17. Electric control of two-dimensional van Hove singularity in oxide ultra-thin films
Donghan Kim*, Younsik Kim*, **Byungmin Sohn**† (co-corresponding author), Minsoo Kim, Bongju Kim, Tae Won Noh, and Changyoung Kim†
Adv. Mater. 2207188 (2023).

16. Tuning orbital-selective phase transitions in a two-dimensional Hund's correlated system
Eun Kyo Ko*, Sungsoo Hahn*, Changhee Sohn, Sangmin Lee, Seung-Sup B. Lee, **Byungmin Sohn**, Jeong Rae Kim, Jaeseok Son, Jeongkeun Sohn, Youngdo Kim, Donghan Kim, Miyoung Kim, Choong H. Kim†, Changyoung Kim†, and Tae Won Noh†
arXiv:2210.05621 [cond-mat.str-el]

15. Heteroepitaxial control of Fermi liquid, Hund metal, and Mott insulator phases in the single-atomic-layer limit
Jeong Rae Kim*, **Byungmin Sohn*** (co-first author), Hyeong Jun Lee*, Sangmin Lee, Eun Kyo Ko, Sungsoo Hahn, Sangjae Lee, Younsik Kim, Donghan Kim, Hong Joon Kim, Youngdo Kim, Jaeseok Son, Charles H. Ahn, Frederick J. Walker, Ara Go, Miyoung Kim, Choong H. Kim†, Changyoung Kim†, and Tae Won Noh†
Adv. Mater. 2208833 (2023).

14. Evolution of electronic band reconstruction in thickness-controlled perovskite $SrRuO_3$ thin films
Byungmin Sohn and Changyoung Kim†
J. Korean Phys. Soc. 81, 1250-1256 (2022).

13. Observation of Spin-Dependent Dual Ferromagnetism in Perovskite Ruthenates
Sungsoo Hahn*, **Byungmin Sohn*** (co-first author), Minjae Kim†, Jeong Rae Kim, Soonsang Huh, Younsik Kim, Wonshik Kyung, Minsoo Kim, Donghan Kim, Youngdo Kim, Tae Won Noh, Ji Hoon Shim, and Changyoung Kim†
Phys. Rev. Lett. 127, 256401 (2021).

12. Observation of metallic electronic structure in a single-atomic-layer oxide
Byungmin Sohn*, Jeong Rae Kim*, Choong H. Kim, Sangmin Lee, Sungsoo Hahn, Younsik Kim, Soonsang Huh, Donghan Kim, Youngdo Kim, Wonshik Kyung, Minsoo Kim, Miyoung Kim, Tae Won Noh†, and Changyoung Kim†
Nat. Commun. 12, 6171 (2021).

11. Sign-tunable anomalous Hall effect induced by symmetry-protected nodal structures in ferromagnetic perovskite oxide thin films
Byungmin Sohn*, Eunwoo Lee*, Se Young Park†, Wonshik Kyung, Jinwoong Hwang, Jonathan D. Denlinger, Minsoo Kim, Donghan Kim, Bongju Kim, Hanyoung Ryu, Soonsang Huh, Ji Seop Oh, Jong Keun Jung, Dongjin Oh, Younsik Kim, Moonsup Han, Tae Won Noh, Bohm-Jung Yang†, and Changyoung Kim†
Nat. Mater. 20, 1643-1649 (2021).

10. Deep learning-based statistical noise reduction for multidimensional spectral data
Younsik Kim, Dongjin Oh, Soonsang Huh, Dongjoon Song, Sunbeom Jeong, Junyoung Kwon, Minsoo Kim, Donghan Kim, Hanyoung Ryu, Jongkeun Jung, Wonshik Kyung, **Byungmin Sohn**, Suyoung Lee, Jounghoon Hyun, Yeonghoon Lee, Yeongkwan Kim, and Changyoung Kim†
Rev. Sci. Instrum. 92, 073901 (2021)

9. Stable humplike Hall effect and noncoplanar spin textures in $SrRuO_3$ ultrathin films
Byungmin Sohn, Bongju Kim†, Se Young Park, Hwan Young Choi, Jae Young Moon, Taeyang Choi, Young Jai Choi, Tae Won Noh, Hua Zhou, Jun Woo Choi, Alessandro Bombardi, Dan. G. Porter, Seo Hyoung Chang†, Jung Hoon Han, and Changyoung Kim†
Phys. Rev. Research **3**, 023232 (2021)

8. Capping and gate control of anomalous Hall effect and hump structure in ultra-thin $SrRuO_3$ films
Donghan Kim*, **Byungmin Sohn*** (co-first author), Minsoo Kim, Sungsoo Hahn, Youngdo Kim, Jong Hyuk

Kim, Young Jai Choi, and Changyoung Kim†
Appl. Phys. Lett. **118** 173102 (2021)

7. Detection of the Chiral Spin Structure in Ferromagnetic $SrRuO_3$ Thin Film
Hai Huang, Sang-Jun Lee, Bongju Kim†, **Byungmin Sohn**, Changyoung Kim, Chi-Chang Kao, and Jun-Sik Lee†
ACS Appl. Mater. Interfaces **12**, 37757-37763 (2020)

6. Electronic band structure of (111) $SrRuO_3$ thin film - an angle-resolved photoemission spectroscopy study
Hanyoung Ryu, Yukiaki Ishida, Bongju Kim, Jeong Rae Kim, Woo Jin Kim, Yoshimitsu Kohama, Shusaku Imajo, Zhuo Yang, Wonshik Kyung, Sungsoo Hahn, **Byungmin Sohn**, Inkyung Song, Minsoo Kim, Soonsang Huh, Jongkeun Jung, Donghan Kim, Tae Won Noh†, Saikat Das†, and Changyoung Kim†
Phys. Rev. B **102**, 041102(R) (2020)

5. $\sqrt{2} \times \sqrt{2}R45^\circ$ surface reconstruction and electronic structure of $BaSnO_3$ film
Shoresh Soltani, Sungyun Hong, Bongju Kim, Donghan Kim, Jong Keun Jun, **Byungmin Sohn**, Tae Won Noh, Kookrin Char, and Changyoung Kim†
Phys. Rev. Materials **4**, 055003 (2020)

4. Hump-like structure in Hall signal from $SrRuO_3$ ultra-thin films without inhomogeneous anomalous Hall effect
Byungmin Sohn, Bongju Kim, Jun Woo Choi, Seo Hyoung Chang, Jung Hoon Han, and Changyoung Kim†
Curr. Appl. Phys. **20**, 186 (2020)

3. Orbital-selective confinement effect of Ru 4d orbitals in $SrRuO_3$ ultrathin film
Soonmin Kang, Yi Tseng, Beom Hyun Kim, Seokhwan Yun, **Byungmin Sohn**, Bongju Kim, Daniel McNally, Eugenio Paris, Choong H. Kim, Changyoung Kim, Tae Won Noh, Sumio Ishihara, Thorsten Schmitt, and Je-Geun Park†
Phys. Rev. B **99**, 045113 (2019)

2. Structural investigation of the insulator-metal transition in $NiS_{2-x}Se_x$ compounds
Garam Han, Sungkyun Choi, Hwanbeom Cho, **Byungmin Sohn**, Je-Geun Park, and Changyoung Kim†
Phys. Rev. B **98**, 125114 (2018)

1. Electronic characteristics of ultrathin $SrRuO_3$ films and their relationship with themetal-insulator transition
Subeen Pang, Yoonkoo Kim, Yeong Jae Shin, **Byungmin Sohn**, SeungYong Lee, Tae Won Noh, and Miyoung Kim†
Appl. Microsc. **47**, 187-202 (2017)

Presentations

16. **(Oral presentation)** Interfacial metallic ferromagnetism coupled to a two-dimensional electron gas
Material Research Society (MRS) Spring meeting, San Francisco, USA
April, 2023

15. **(Seminar)** Engineering electronic structures on correlated interfaces
National Synchrotron Light Source II, Brookhaven National Laboratory, Upton, USA
March, 2023

14. **(Oral presentation, invited)** Engineering electronic structures on correlated interfaces
ARPES for quantum material research and 4GSR, Yonsei University, Korea
December, 2022

13. **(Oral presentation)** Quasiparticle evolution on a high-T_C superconductor surface decorated with sub-monolayer magnetic atoms
American Physics Society (APS) Spring meeting, Chicago, USA
March, 2022

12. **(Oral presentation, invited)** Emergent phenomena in $SrRuO_3$ ultrathin films
Oxide Superspin 2021 (OSS2021), Japan
Dec, 2021

11. **(Oral presentation)** Sign-tunable anomalous Hall effect induced by symmetry-protected nodal structures in ferromagnetic perovskite oxide thin films
Korean Physical Society Spring meeting, Korea
July, 2020

10. **(Oral presentation)** Sign-tunable anomalous Hall effect induced by symmetry-protected nodal structures in ferromagnetic perovskite oxide thin films (Cancelled)
American Physics Society (APS) March meeting, Colorado, USA
March, 2020

9. **(Seminar)** Sign-tunable anomalous Hall effect induced by symmetry-protected nodal structures in ferromagnetic perovskite oxide thin films
Center for Correlated Electron Systems, Institute for Basic Science (IBS), Seoul, Korea
February, 2020

8. **(Oral presentation)** Intrinsic anomalous Hall effect induced by momentum-space Berry curvature in $SrRuO_3$ thin film
Korean Physical Society Fall meeting, Gwangju, Korea
October, 2019

7. **(Poster presentation)** Emergence of robust 2D skyrmions in $SrRuO_3$ ultrathin film
Conference on Condensed Matter Physics (CCMP), Liyang, China
June, 2019

6. **(Oral presentation)** Emergence of robust 2D skyrmions in $SrRuO_3$ ultrathin film
Korean Physical Society March meeting, Daejeon, Korea
April, 2019

5. **(Oral presentation)** Topological Hall effect in ultra-thin $SrRuO_3$ film
Exchange program for 3 universities, Seoul National University (SNU), Seoul, Korea
January, 2019

4. **(Poster presentation)** Robust 2D-like Skyrmions in ultrathin $SrRuO_3$ film
Korean Physical Society Fall meeting, Changwon, Korea
October, 2018

3. **(Oral presentation)** Topological Hall effect in ultra-thin $SrRuO_3$ film
Center for Correlated Electron Systems, Institute for Basic Science (IBS), Seoul, Korea
June, 2018

2. **(Oral presentation)** Topological Hall effect in ultra-thin $SrRuO_3$ film
American Physics Society (APS) March meeting, California, USA
March, 2018

1. **(Seminar)** Skyrmion phase and topological Hall effect in $SrRuO_3$ ultra thin films
Center for Correlated Electron Systems, Institute for Basic Science (IBS), Seoul, Korea
December, 2017