

SUK HYUN SUNG

2125 H. H. Dow Bldg.
2300 Hayward St.
Ann Arbor, MI 48109

January 2021
+1 (734) 263-7715
sukhsung@umich.edu
shsung.com

EDUCATION

MS/Ph.D (Materials Science & Engineering), University of Michigan, Ann Arbor, MI Current

- Research Emphasis: Electron Microscopy, Low-dimension Materials, Quantum Materials.

Bachelor of Science (Engineering Physics), Cornell University, Ithaca, NY Aug. 2012 – Jan. 2016

- Study Emphasis: Solid State Physics, Materials Science
- Deans's List: Fall 2012, Fall 2013, Fall 2014, Spring 2015

PUBLICATIONS

R. Yalisove*, **S. H. Sung***, P. Ercius, and R. Hovden "The Limits of Resolution and Dose for Aberration-Corrected Tomography" *Physical Review Applied* **15**, 014003, (2021)

N. Schnitzer*, **S. H. Sung***, and R. Hovden "Optimal STEM Convergence Angle Selection using a Convolutional Neural Network and Strehl Ratio" *Microscopy and Microanalysis* **26**, 52, 160–161, (2020)

P. B. Meisenheimer, L. D. Williams, **S. H. Sung**, J. Gim, P. Shafer, G. N. Kotsonis, J.-P. Maria, M. Trassin, R. Hovden, E. Kioupakis, et al. "Magnetic frustration control through tunable stereochemically driven disorder in entropy-stabilized oxides" *Physical Review Materials* **3**, 10, 104420, (2019)

Y. Wang, Y. Wu, J. Schwartz, **S. H. Sung**, R. Hovden, and Z. Mi "A Single-Junction Cathodic Approach for Stable Unassisted Solar Water Splitting" *Joule* **3**, 10, 2444–2456, (2019)

S. H. Sung*, N. Schnitzer*, L. Brown, J. Park, and R. Hovden "Stacking, strain, and twist in 2D materials quantified by 3D electron diffraction" *Physical Review Materials* **3**, 6, 064003, (2019)

N. Schnitzer, **S. H. Sung**[†], and R. Hovden "Introduction to the Ronchigram and its Calculation with Ronchigram.com" *Microscopy Today* **27**, 3, 12–15, (2019)

H. Yoo, R. Engelke, S. Carr, S. Fang, K. Zhang, P. Cazeaux, **S. H. Sung**, R. Hovden, A. W. Tsen, T. Taniguchi, et al. "Atomic and electronic reconstruction at the van der Waals interface in twisted bilayer graphene" *Nature Materials* **18**, 5, 448–453, (2019)

S. Chatterjee, **S. H. Sung**, D. J. Baek, L. F. Kourkoutis, D. G. Schlom, and K. M. Shen "Epitaxial growth and electronic properties of mixed valence YbAl₃ thin films" *Journal of Applied Physics* **120**, 3, 035105, (2016)

Y. Nie, Y. Zhu, C.-H. Lee, L. F. Kourkoutis, J. A. Mundy, J. Junquera, P. Ghosez, D. Baek, **S. Sung**, X. Xi, et al. "Atomically precise interfaces from non-stoichiometric deposition" *Nature Communications* **5**, 1, 1–8, (2014)

* The authors contributed equally

[†] Corresponding Author

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CONFERENCE ABSTRACTS

- ‡R. Yalisove*, **S. H. Sung***, and R. Hovden “Defining Theoretical Limits of Aberration-Corrected Electron Tomography: New Bounds for Resolution, Object Size, and Dose” *Microscopy and Microanalysis* **25**, 1810–1811, (2019)
- N. Schnitzer*, **S. H. Sung***, and R. Hovden “Maximal Resolution from the Ronchigram: Human vs. Deep Learning” *Microscopy and Microanalysis* **25**, 160–161, (2019)
- ‡N. Schnitzer*, **S. H. Sung***, and R. Hovden “Stacking, Strain, & Stiffness of 2D Transition Metal Dichalcogenides Quantified through Reciprocal Space” *Microscopy and Microanalysis* **24**, 1586–1587, (2018)
- H. Yoo, K. Zhang, R. Engelke, P. Cazeaux, **S. H. Sung**, R. Hovden, A. Tsen, T. Taniguchi, K. Watanabe, G.-C. Yi, M. Kim, M. Luskin, E. Tadmor, and P. Kim “Atomic Scale Relaxation at the van der Waals Interface in Twisted Bilayer Graphene” *Bulletin of the American Physical Society* **63**, , ()
- R. Engelke, h. yoo hyobin, K. Zhang, P. Cazeaux, **S. H. Sung**, R. Hovden, A. Tsen, T. Taniguchi, K. Watanabe, G.-C. Yi, M. Kim, M. Luskin, E. Tadmor, and P. Kim “Structural study of atomic relaxation and commensurate transition in twisted bilayer graphene” *Bulletin of the American Physical Society* **63**, , ()
- ‡ First Authors Received M & M Student Scholar Awards

PRESENTATIONS

- S. H. Sung**, N. Schnitzer, and R. Hovden “Maximal Resolution from the Ronchigram: Human vs. Deep Learning” *AI for Atoms: How to Machine Learn STEM* (2020) ORNL/CNMS Virtual Workshop
- S. H. Sung**, Y. M. Goh, H. Yoo, R. Engelke, P. Kim, and H. Robert “Torsional Periodic Lattice Distortion in Twisted Bilayer Graphene” *Microscopy and Microanalysis* (2020) Milwaukee, WI
- R. Yalisove*, **S. H. Sung***, J. Schwartz, C. Groschner, P. Pelz, H. Zheng, Y. Jiang, C. Ophus, M. C. Scott, P. Ercius, and H. Robert “Achieving High-Resolution of Large Specimens Using Aberration-Corrected Electron Tomography” *Microscopy and Microanalysis* (2020) Milwaukee, WI
- R. Hovden, R. Yalisove, J. Schwartz, **S. H. Sung**, Y. Jiang, and P. Ercius “Filling in the Missing Wedge with Aberration-Corrected Electron Tomography” *Microscopy and Microanalysis* (2020) Milwaukee, WI
- R. Engelke, H. Yoo, S. Carr, **S. H. Sung**, K. Zhang, A. M. Valdivia, E. Tadmor, R. Hovden, K. E., and P. Kim “Imaging of 2Dimensional Dislocation Networks in Twisted Bilayer Graphene and Beyond” *Microscopy and Microanalysis* (2020) Milwaukee, WI
- R. Hovden, **S. H. Sung**, N. Schnitzer, S. Novakov, I. El Baggari, B. H. Savitzky, J. T. Heron, and L. F. Kourkoutis “The Structure of Charge Density Wave Phase Transitions in Atomically Thin Materials” *Microscopy and Microanalysis* (2020) Milwaukee, WI
- R. Yalisove*, **S. H. Sung***, and R. Hovden “Defining Theoretical Limits of Aberration-Corrected Electron Tomography: New Bounds for Resolution, Object Size, and Dose” *Frontiers of Electron Microscopy and Materials Science* (2018) Ashville, NC
- ‡R. Yalisove*, **S. H. Sung***, and R. Hovden “Defining Theoretical Limits of Aberration-Corrected Electron Tomography: New Bounds for Resolution, Object Size, and Dose” *Microscopy and Microanalysis* (2019)

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Portland, OR

N. Schnitzer*, **S. H. Sung***, and R. Hovden "Maximal Resolution from the Ronchigram: Human vs. Deep Learning" *Microscopy and Microanalysis* (2019) Portland, OR

‡N. Schnitzer*, **S. H. Sung***, and R. Hovden "Stacking, Strain, & Stiffness of 2D Transition Metal Dichalcogenides Quantified through Reciprocal Space" *Microscopy and Microanalysis* (2018) Baltimore, MD

*The authors contributed equally

RESEARCH EXPERIENCES

Graduate Student Research Assistant, Hovden Lab, University of Michigan Apr. 2016 – Current

Research Emphasis: 2D Materials, Quantum Materials

Visiting Scientist, Kourkoutis Electron Microscopy Group, Cornell University Jan. 2016 – Jun 2016

Research Emphasis: Nano-characterization of thin-film complex oxide heterostructure using scanning transmission electron microscopy (STEM), electron energy loss spectroscopy (EELS) and energy dispersive x-ray spectroscopy (EDS)

- Prepared epitaxially grown thin film YbAl₃ on MgO substrate with LuAl₃ and Al buffer into electron-transparently thin lamella using focused ion beam (FIB).

Performed STEM and EDS to examine and confirm the epitaxial growth of the film and separation of the YbAl₃ layer from the intermediate buffer layers.

[Chatterjee, et al. Journal of Applied Physics, 120, 035105 (2016)]

- Examined epitaxially grown thin film Nd_{0.5}Sr_{0.5}MnO₃ on SrTiO₃ substrate the system was expected to show short-range A-site cation ordering behavior.

Confirmed the presence of the ordering using Z-contrast HAADF-STEM and atomic resolution EELS data. The result is in preparation for submission.

Undergraduate Researcher, Kourkoutis Electron Microscopy Group Feb. 2014 – Dec. 2015

- Preparation of electron-transparent (S)TEM specimen via tripod polishing technique

- Multislice simulation of STEM

AWARDS

Dorothy & Fred Chau Award: Excellence in Undergraduate Research May. 2016

Engineering Learning Initiatives Undergraduate Research Award Apr. 2014 & Sept. 2014

SKILLS

Electron Microscopy: TEM, STEM, SEM, Multislice Simulations

Spectroscopy: Quantitative EELS and EDS

TEM Sample Preparation: Tripod Polishing, Focused Ion Beam

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Software: MATLAB, Python, HTML/CSS/Javascript, C, ImageJ, Adobe Illustrator, Adobe Photoshop, Blender

TEACHING EXPERIENCES

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| Graduate Student Instructor , University of Michigan | Aug. 2019 – Dec. 2019 |
| • Teaching assistant for 'Introduction to Electron Microscopy (MSE 562)' | |
| Undergraduate Teaching Assistant , Cornell University | Aug. 2015 – Dec. 2015 |
| • Assisted graduated TA for 'Physics I: Mechanics and Heat (PHYS 1112)' | |
| Paid Tutor | Jun. 2012 – Aug. 2017 |
| • Tutored various high school/AP level mathematics and science courses | |

REFERENCE

Professor Robert Hovden
E-mail: hovden@umich.edu

University of Michigan, Ann Arbor, MI