

# Sung Beom Cho

## Curriculum Vitae

### Education

- 2007–2011 **B.S. in Materials Science and Engineering (Dual Major, Summa Cum Laude)**, GPA: 4.2/4.5, Hanyang University, Advisor: Prof. Yong-Chae Chung.
- 2008–2011 **B.S. in Physics (Dual Major, Summa Cum Laude)**, GPA: 4.2/4.5, Hanyang University, Advisor: Prof. Jun-Hyung Cho.
- 2011–2017 **Ph.D in Materials Science and Engineering**, GPA: 4.4/4.5, Hanyang University, Advisor: Prof. Yong-Chae Chung.

### Work Experience

- 2017–2018 **Postdoctoral Research Associate**, Washington University in St. Louis, Advisor: Prof. Rohan Mishra.
- 2018–2022 **Senior Researcher**, Korea Institute of Ceramic Engineering and Technology.
- 2021–2022 **Head of Virtual Engineering Center**, Korea Institute of Ceramic Engineering and Technology.
- 2022–present **Assistant Professor**, Department of Materials Science and Engineering, Ajou University.

### Research Summary

I am specialized in multiscale and multiphysics modeling of materials by coordinating various simulation method and theory. I am currently working on materials discovery and predicting synthesizability of materials using machine learning. I published more than 50 research articles in peer-reviewed journals including Advanced Materials, Physical Review Letters, and ACS Energy Letters. The total citation is 1202, and h-index is 18 now (Mar. 2023). I am actively developing new theoretical framework for novel materials phenomena and working on its industrial applications.

### Expertise

Multiscale Modeling: Density Functional Theory (DFT), Molecular Dynamics (MD) and Finite Element Method (FEM)

Multiphysics Modeling: Structural analysis, chemical analysis, fluid dynamics, semiconductor physics, electrostatics, and plasma dynamics

Metamodelling, AI-based parameter optimization, Data mining on materials, and High-throughput screening

Thermodynamic modeling on nucleation, alloying, defects, and surface reaction

Scientific programming skills with Fortran, C/C++, Perl, and Python

## Awards & Fellowship

- 2007–2010 National Science & Technology Scholarship from National Research Foundation
- 2011–2016 Global Ph.D Fellowship (GPF) from National Research Foundation
- 2015 Chair of GPF Society
- 2016 Excellent TA Awards
- 2017 Seal of Excellence from Horizon 2020's MSCA-IF
- 2018 Marie Curie Individual Fellowship (Declined)
- 2020 Best Oral Presentation Award, *The Korean Institute of Electrical and Electronic Material Engineers (KIEEME) Summer Meeting*
- 2021 Best Employee Award of the Year (Research Division, KICET)

## Patent and Industrial Support

- 2020 Tech Transfer: Ceramic materials composition prediction for ozone generation application: Inwoo Corp.
- 2020 Tech Transfer: AI-based design parameter optimization for ozone generator: Inwoo Corp.
- 2020 Patent: Programming algorithm for appropriate epitaxy substrate search (Korean Patent No. 10-2098572)
- 2021 Tech Transfer: Simulation-based random number generation algorithm development: PSDL
- 2022 Tech Transfer: Simulation-based optimization for heat exchanger of cooler data center: Databean
- 2023–2025 Samsung Electronics Research Project: Electromechanical coupling on DRAM gate oxide materials

## Services

- 2017–present Journal Reviewer: Nature Nanotechnology, Physical Review Letters, Physical Review Materials, Physical Review B, Advanced Energy Materials, Advanced Materials, Applied Physics Letters, ACS Nano, Applied Physics Letters
- 2021–2022 Head of the Virtual Engineering Center
- 2015 Chairman of GPF Society
- 2014–2016 Board committee of GPF Society

## Recent Selected Journal Publications (*h*-index: 17)

([Link to Google Scholar Page for Full Publication List](#))

- 2023 Giulio Fatti, Hyunseung Kim, Changwan Sohn, Minah Park, Yeong-won Lim, Zhuohan Li, Kwi-II Park, Izabela Szlufarska, Hyunseok Ko, Chang Kyu Jeong\*, **Sung Beom Cho\***, Uncertainty and Irreproducibility of Triboelectricity Based on Interface Mechanochemistry, *Physical Review Letters* 131 166201
- 2023 Han Uk Lee, Seungmin Han, Dong Geon Lee, Hyunseok Ko, Juhyun Lee, Won Bin Im, Taeseup Song, Junghyun Choi, **Sung Beom Cho\***, 'Isovalent multi-component doping strategy for stabilizing cubic-Li7La3Zr2O12 with excellent Li mobility', *Chemical Engineering Journals* 471 144552

- 2023 Hyeon Woo Kim, Joo Hyeong Han, Hyunseok Ko, Tuhin Samanta, Dong Geon Lee, Dong Won Jeon, Woongchan Kim, Yong-Chae Chung, Won Bin Im, **Sung Beom Cho\***, 'High-Throughput Screening on Halide Perovskite Derivatives and Rational Design of Cs<sub>3</sub>LuCl<sub>6</sub>', *ACS Energy Letters* 8 3621
- 2023 Dae Hwan Lee, Seyeong Lim, Chanhyeok Kim, Han Uk Lee, Dasol Chung, Yelim Choi, Jongmin Choi, Younghoon Kim, **Sung Beom Cho\***, Hong Il Kim\*, Taiho Park\*, 'Tailoring Rigid Segments in Dopant-Free Polymeric Hole Transport Materials for Perovskite Quantum Dot Solar Cells', *ACS Energy Letters* 8 1839
- 2023 Hye Mi Kim, Su Hwan Choi, Han Uk Lee, **Sung Beom Cho\***, Jin Seong Park\*, 'The Significance of an In Situ ALD Al<sub>2</sub>O<sub>3</sub> Stacked Structure for p-type SnO TFT Performance and Monolithic All ALD channel CMOS Inverter Applications', *Advanced Electronic Materials* 9 2201202
- 2023 Hyunseok Ko, Wonkyeong Son, Min Sung Kang, Han Uk Lee, Chan-Yeup Chung, Seungwu Han, Changsoo Choi, **Sung Beom Cho\***, 'Why does water in porous carbon generate electricity?: Electrokinetic role of proton in water droplet induced hydrovoltaic system of hydrophilic porous carbon', *Journal of Materials Chemistry A* 11 1148, **(highlighted as back cover)**
- 2022 Joo Hyeong Han, Tuhin Samanta, Yong Min Park, Ha Jun Kim, Noolu Srinivasa Manikanta Viswanath, Hyeon Woo Kim, Bo Kyung Cha, **Sung Beom Cho\***, **Won Bin Im\***, 'Highly Stable Zero-Dimensional Lead-Free Metal Halides for X-ray Imaging', *ACS Energy Letters* 8 542-552
- 2022 Han Uk Lee†, Hyeon Woo Kim†, Giulio Fatti, Hyunseok Ko, and **Sung Beom Cho\***, 'Substrate effect on diverse metastable heterostructure In<sub>2</sub>O<sub>3</sub>-Ga<sub>2</sub>O<sub>3</sub> alloy', *ACS Applied Electronic Materials* 6 2711
- 2022 Seon-Jae Kim†, Hyun Woo Kim†, Sang Gu Lee, Dae-Woo Jeon, Ji-Hyeon Park\*, **Sung Beom Cho\***, 'Pre-reaction suppressing strategy for α-Ga<sub>2</sub>O<sub>3</sub> halide vapor pressure epitaxy using asymmetric precursor gas flow', *CrystEngComm* 24 3049
- 2021 **Sung Beom Cho†**, Cheng He†, Shrihari Sankarasubramanian†, Arashdeep Thind, Javier Parrondo, Jordan Hachtel, Albina Borisevich, Juan-Carlos Idrobo, Vijay Ramani\* and Rohan Mishra\*, 'A durable, inexpensive oxygen reduction reaction electrocatalyst', *Chem. Sus. Chem.* 14 4680 **(Highlighted as front cover)**
- 2021 Yeon-Gyu Kim, Hyunseung Kim, Gyeong-Ja lee, Han-Uk Lee, Sang Gu Lee, Changyeon Baek, Min-Ku Lee, Jin-Ju Park, Qing Wang, **Sung Beom Cho\***, Chang Kyu Jeong\*, Kwi-Il Park\* 'Flexoelectric-Boosted Piezoelectricity of BaTiO<sub>3</sub>@SrTiO<sub>3</sub> Core-Shell Nanostructure Determined by Multiscale Simulations for Flexible Energy Harvesters', *Nano Energy*, 89, 106469
- 2021 Hyunseok Ko†, Yeong-won Lim†, Seungwu Han, Chang Kyu Jeong\*, **Sung Beom Cho\***, 'Triboelectrification: Backflow and Stuck Charges are Key', *ACS Energy Letters*, 6, 2792
- 2021 Hyeon Woo Kim, Hyunseok Ko, Yong-Chae Chung, **Sung Beom Cho\***, 'Heterostructural phase diagram of Ga<sub>2</sub>O<sub>3</sub>-based solid solution with Al<sub>2</sub>O<sub>3</sub>', *Journal of the European Ceramic Society*, 41, 611
- 2020 Praneeth Ranga †, **Sung Beom Cho†**, Rohan Mishra\*, Sriram Krishnamoorthy\* 'Highly tunable, polarization-engineered two-dimensional electron gas in ε-AlGaO<sub>3</sub>/ε-Ga<sub>2</sub>O<sub>3</sub> heterostructures', *Applied Physics Express*, 13, 061009

- 2020 Sungwoo Chun, Changhyun Pang\*, and **Sung Beom Cho\***, 'A versatile strategy for highly sensitive and efficient triboelectric energy generation by in-plane stimuli', *Advanced Materials*, 32, 2070009 (**Highlighted as front cover**)
- 2020 Sungwoo Chun, **Sung Beom Cho** Wonkyeong Son, and Changsoon Choi, 'Serpentine-pattern effects on biaxial stretching of percolative graphene-nanoparticle films', *Nanotechnology*, 31, 085303
- 2018 **Sung Beom Cho**, Jaume Gazquez, Yoon Myung, Xing Huang, Parag Banerjee, and Rohan Mishra\*, 'Intrinsic point defects and stacking faults in Bismuth Triiodide(BiI<sub>3</sub>)' *Physical Review Materials*, 2, 064602
- 2018 **Sung Beom Cho** and Rohan Mishra\*, 'Epitaxial engineering of polar  $\epsilon$ -Ga<sub>2</sub>O<sub>3</sub> for tunable two-dimensional electron gas at the heterointerface' *Applied Physics Letters* (**selected as highly cited papers in semiconductor field**), 112, 162101