Gang Seob Jung

Eugene Wigner Fellow
Computational Science & Engineering Division (CSED)
Oak Ridge National Laboratory (ORNL)
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EDUCATION

Doctor of Philosophy in Civil & Environmental Engineering (GPA 4.9/5.0) **09/2013- 06/2019**
Massachusetts Institute of Technology, Department of CEE (Cambridge, U.S.)
ADVISOR: Markus J. Buehler

Master of Science in Physics (GPA 3.9/4.0) **04/2006 - 03/2008**
The University of Tokyo, Department of Physics (Tokyo, Japan)
ADVISOR: Shinji Tsuneyuki

Bachelor of Science in Physics, (GPA 3.9/4.0, graduation with first prize) **04/2002 - 03/2006**
University of Tsukuba, College of Natural Science (Tsukuba, Japan)

RESEARCH INTEREST

Understanding the **materials synthesis process**, **interaction between different phases**, **microstructure evolution**, **mechanical failure,** and **structure-property relation** from micro- to macro-scales by utilizing **computational modeling** based on multiscale and multiphysics paradigms.

RESEARCH PROJECT

Wigner Fellowship Project: "Development of integrated multiscale fluid-solid interface models for the predictive design of energy and water processes".

PROFESSIONAL EXPERIENCE

Eugene Wigner Fellow, CSED, ORNL, US (Advisor: Stephan Irle) **2019-Now**
Postdoctoral Research Associate, CEE, MIT, US (Advisor: Markus J. Buehler) **2019**
Graduate Research Assistant, CEE, MIT, US (Advisor: Markus J. Buehler) **2013-2019**
Foldable and adaptive two-dimensional electronics MURI (AFOSR)
Models to predict biomaterials performance (NIH)
Researcher, KISTI, Daejeon, Korea **2011-2013**
Development of MM_PAR, C++ code for classical MD with MPI/OpenMP
High-performance computing
Research Engineer, LG DISPLAY, Paju, Korea (military service) **2008-2011**
Touch panel embedded in LCD: FEM simulations and Experimental analysis
Graduate Research Assistant, Physics, Tokyo University (Advisor: Shinji Tsuneyuki) **2006-2008**
Free energy calculations with extended ensemble methods

HONORS & AWARDS

Japan-Korea Joint Government Scholarship **2001 - 2006**
University of Tokyo Fellowship **2006 - 2008**
LG DISPLAY Industrial Scholarship **2007 - 2008**
MIT Presidential Graduate Fellowship (Edward H. Linde) **2013 - 2014**
ORNL Distinguished Staff Fellowship (Eugene Wigner) **2019 - Now**
The First Prize (Physics), University of Tsukuba **2006**

TEACHING and MENTORING

Teaching Assistant, Physics, University of Tokyo, Japan **2007**
Research Mentor for MIT CEE Undergraduate Research Opportunity Program **2016-2018**
Research Mentor for Research Scholar Institute (RSI) for K-12 students **2015**

PUBLICATIONS (*Co-first author, †Corresponding author), **Google Citation +500**

25. M Milazzo, **GS Jung**, S Danti, and MJ Buehler†, Wave propagation and energy dissipation in collagen molecule. ***in submission***

24. **GS Jung**, JH Warner, and MJ Buehler†, Fracture and Crack Propagation: Recent Progress in Computational Modeling and Experiments. *in preparation*

23. H Wang*, WS Leong*, Z Yao*, **GS Jung**, O Song, M Hempel, T Palacios, G Chen, MJ Buehler, A Aspuru-Guzik, J Kong†, Realizing Frank-van der Merwe Growth in Bilayer Graphene. ***in revision***

22. J Chen, **GS Jung**, GH Ryu, RJ Chang, S Zhou, Y Wen, MJ Buehler, and JH Warner†, Atomically Sharp Dual Grain Boundaries in 2D WS_2 Bilayers. ***Small,*** **2019**. 30, 1902590.

21. Y Zhou, SG Sarwat, **GS Jung**, MJ Buehler, H Bhaskaran, and JH Warner†, Grain Boundaries as Electrical Conduction Channels in Polycrystalline Monolayer WS_2. ***ACS Applied Materials & Interfaces***, **2019**. *11*, 10189.

20. J Yeo*, Y Qiu*, **GS Jung**, Y-W Zhang, MJ Buehler†, and DL Kaplan†, Adverse effects of Alport syndrome-related missense mutations on collagen IV: unified insights from molecular dynamics simulations and experiments. ***In revision***

19. **GS Jung**, MJ Buehler†. Hierarchical Designs of Lightweight and Tough Structures with Triply Periodic Minimal Surfaces. *in preparation*

18. **GS Jung**, JH Warner, MJ Buehler†. Mechanics of MoS_2 Monolayer with Point Defects and Grain Boundaries. *in preparation*

17. JL Zitnay, **GS Jung**, A Lin, Z Qin, Y Li, SM Yu, MJ Buehler, JA Weiss†, Progressive molecular failure of collagen as a mechanism of tendon fatigue. ***in submission***

16. **GS Jung***, S Wang*, Z Qin, S Zhou, M Danaie, AI Kirkland, MJ Buehler†, JH Warner†, Propagation Anisotropy Due to Local Lattice Distortions. ***ACS Nano,*** **2019**. *13*, 5693-5702.

15. E Beniash, CA Stifler, C-Y Sun, **GS Jung**, Z Qin, MJ Buehler†, PUPA Gilbert†. The hidden structure of human enamel. ***Nature Communications***, **2019**. *10*, 4383

14. **GS Jung**, MJ Buehler†. Atomic-scale hardening mechanisms apply on larger scales in architected materials. ***Nature***, **2019**. *565*, 303-304

13. J Yeo*, **GS Jung***, FJ Martin-Martinez*, J Beem, Z Qin, MJ Buehler†. Multiscale design of graphyne materials, from atom to structure. ***Advanced Materials***, **2019**. 1805660

12. **GS Jung**, MJ Buehler†. Multiscale Mechanics of Triply Periodic Minimal Surfaces of Three-Dimensional Graphene Foams. ***Nano Letters,*** **2018**. *18*, 4845-4852

11. J Yeo, **GS Jung**, FJ Martin-Martinez, S Ling, GX Gu, Z Qin, MJ Buehler†.Materials-by-Design: Computation, Synthesis, and Characterization from Atoms to Structures. ***Physica Scripta***, **2018,** *93*, 053003.

10. **GS Jung***, S Wang*, Z Qin, FJ Martin-Martinez, JH. Warner† and MJ Buehler†. Interlocking friction governs mechanical fracture of bilayer MoS_2. ***ACS Nano***, **2018**, *10*, 3600-3608.

9. J Yeo, **GS Jung**, A Tarakanova, FJ Martín-Martínez, Z Qin, Y Cheng, Y-W Zhang, and MJ Buehler†, Multiscale modeling of keratin, collagen, elastin and related human diseases: Perspectives from atomistic to coarse-grained molecular dynamics simulations. ***Extreme Mechanics Letters***, **2018**, *20*, 112-124.

8. Y Han*, MY Li*, **GS Jung***, MA Marsalis, Z Qin, MJ Buehler, LJ Li† and DA Muller†, Sub-nanometre channels embedded in two-dimensional materials. ***Nature Materials***, **2018**, *17*, 129-133 (Feb. 2018 COVER Article) MIT News (Dec 7, 2017)

7. **GS Jung**, J Yeo, Z Tian, Z Qin, MJ Buehler†. Unusually low and density-insensitive thermal conductivity of three-dimensional gyroid graphene. ***Nanoscale***, **2017**, *9*, 13477-13484

6. **GS Jung**, MJ Buehler†. Multiscale Modeling of Muscular-Skeletal Systems. ***Annual Review Biomedical Engineering***, **2017**, *19*, 435-57

5. Z Qin*, **GS Jung***, MJ Kang, MJ Buehler†. The mechanics and design of a lightweight three-dimensional graphene assembly. ***Science Advances***, **2017**, *3*, e1601536, MIT News (Jan 6, 2017), CNN News (Jan 13, 2017), Materialstoday (Jan, 12,2017), Discovery's Seeker (Jan 6, 2017)

4. C-T Chen, FJ Martin-Martinez, **GS Jung**, MJ Buehler†. Polydopamine and eumelanin molecular structures investigated with ab-initio calculations. ***Chemical Science***, **2016**, *8*, 1631-41

3. S Wang*, Z Qin*, **GS Jung**, FJ Martin-Martinez, K Zhang, JH Warner† and MJ Buehler†. Atomically Sharp Crack Tips in Monolayer MoS2 and Their Enhanced Toughness by Vacancy Defects. ***ACS Nano***, **2016**, *10*, 9831-9, NanoTechWeb News

2. **GS Jung**, Z Qin, MJ Buehler†. Mechanical Properties and Failure of Biopolymers: Atomistic Reactions to Macroscale Response. In *Polymer Mechanochemistry*, ed. R Boulatov, 369:317-43: Springer International Publishing. ***Topics in Current Chemistry***, **2015**, 317-43

1. **GS Jung**, Z Qin, MJ Buehler†. Molecular mechanics of polycrystalline graphene with enhanced fracture toughness. ***Extreme Mechanics Letters***, **2015**, *2*, 52-9, CEE@MIT News in Brief

THESIS

Title: Extended ensemble molecular dynamics for predicting a material structure **2008**
Master of Science in Physics (The University of Tokyo), Advisor: Shinji Tsuneyuki

Title: Multiscale modeling of two-dimensional materials: structure, properties, and designs **2019**
Doctor of Philosophy in Civil & Environmental Engineering (MIT), Advisor: Markus J. Buehler

CONFERENCES & WORKSHOPS & TALKS

8. **GS Jung "**Multiscale Modeling of Two-Dimensional Materials for Fracture and Crystal Growth", Lawrence Berkeley National Laboratory, May 22, 2019

7. **GS Jung**, MJ Buehler, **"**Multiscale Mechanics of triply periodic minimal surfaces of three-dimensional graphene foams", Multifunctional Materials Workshop, US-Army-Natick Lab, Nov 29, 2018

6. **GS Jung**, MJ Buehler, **"**Molecular mechanics of MoS_2 monolayer with point defect and grain boundary" Materials Research Society (MRS), 2018 Fall Meeting, 2018

5. **GS Jung**, MJ Buehler, **"**Thermal conductivity of triply periodic minimal surface of three-dimensional graphene foams" Materials Research Society (MRS), Fall Meeting, 2018

4. **GS Jung**, S Wang, Z Qin, J Warner, MJ Buehler, **"**Single Atomic Deformation Regulate the Fracture Dynamics and Strength" MIT-MRL Symposium, Cambridge, 2018

3. Martin-Martinez FJ, Z Qin, JJ Yeo, **GS Jung**, Buehler MJ, "Multiscale Modeling of Nanomaterials: DFT and MD simulations" 253rd ACS National Meeting & Exposition, April 4, 2017

2. Z Qin, **GS Jung**, S Wang, FJ Martin-Martinez, J Warner, MJ Buehler, "Mechanics and Fracture of 2D Materials with Defects and Grain Boundaries" AVS 63rd International Symposium & Exhibition, November 6, 2016

1. **GS Jung**, Z Qin, MJ Buehler, **"**Enhanced Fracture Toughness of Polycrystalline Graphene"
Materials Research Society (MRS), Fall Meeting, 2015

PATENTS

5. **GS Jung**, SS Hwang, YJ Yi, JH Lee, Touch panel and liquid crystal display device including the same. US Patent 8,970,509

4. SC An, CS Kim, SS Hwang**, GS Jung**, Touch panel and method for manufacturing the same. US Patent 8,947,370

3. SC An, HK Kang, SS Hwang, **GS Jung**, Touchscreen panel. US Patent 8,970,508

2. **GS Jung**, HK Kang, SC An, SS Hwang, Electrostatic capacity type touch screen panel and method of manufacturing the same. US Patent 8,780,061

1. SS Hwang, **GS Jung**, JY Lee, SJ Yoo, Touchscreen panel. US Patent 8,493,349

SCIENTIFIC REVIEWER WORK

Scientific Reports, Journal of the Mechanical Behavior of Biomedical Materials