SEOKPUM (PUM) KIM
R&D Staff Scientist at Oak Ridge National Lab, TN
| https://scholar.google.com/citations?user=SFUEpIgAAAAJ |

SUMMARY OF QUALIFICATION

▸ Project lead for polymer composite designs and manufacturing process optimization
▸ Professional experiences in manufacturing process optimization and design optimization of polymer composites
▸ Expertise in polymer composites, specifically in computational thermo-mechanical analysis

RESEARCH & TEACHING EXPERIENCES

R&D Staff Scientist at Oak Ridge National Lab, Oak Ridge, TN
- • Lightweight Composites
  - Lead a vehicle seatback project for lightweight composite design ($1M for 2yrs)
  - Led a tufting machinery project for lightweight composite design (30% weight reduction) ($250K for 2yrs)
- • Additive Manufacturing with Composites
  - Lead an A.I-driven hierarchical structure design project for 3D printing ($2M for 4yrs)
  - Lead a high-performance computing project for 3D printing optimization using A.I. ($376K for 1yr)
  - Support an out-of-plane 3D printing project by developing continuous toolpath and optimizing graded structure
  - Support a bio-material 3D printing project by performance simulation and design optimization
- • Process optimization using A.I.
  - Lead an A.I-driven process optimization project for metal stamping ($1M for 2 yrs)

Postdoctoral Researcher at Oak Ridge National Lab, Oak Ridge, TN
- • Additive Manufacturing with Composites and Big Area Additive Manufacturing
  - Computationally predicted the thermal response and the distortion of a 3D-printed part
  - Developed an algorithm for continuous printing to decrease a layer time by half
  - Designed internal patterns of a 3D printed part based on the structure analysis to increase the stiffness by 50%
  - Increased the strength and stiffness by 20% and 100% respectively via Z-pinning approach

Research Assistant at Georgia Institute of Technology, Atlanta, GA
- • <u>Air Force Research Lab (AFRL)</u>: A Framework for Impact Response of Energetic Composites
  - Developed FEA framework using Fortran to model the dynamic impact response of PBX and granular HMX
  - Implemented a chemical kinetics model in the FEA framework
  - Developed stochastic initiation mechanisms of energetic composites
- • <u>Defense Threat Reduction Agency</u>: Design of Energetic Composites at the Microstructure Level
  - Predicted the initiation threshold of the energetic composites upon shock and non-shock loading
  - Obtained a critical impact velocity below which the material is safe
  - Determine the key attributes of microstructures for designing energetic composites

Research Assistant at Seoul National University, Seoul, South Korea
- •Polymer Nano-molding Process: Built MD framework using C++ for polymer molding process in nano channel

Intern at Helsinki University of Technology, Helsinki, Finland
- • Created a web-based interface of virtual ecosystem to improve students' understanding of neocybernetics

Undergraduate Researcher at the University of Birmingham, Birmingham, UK
- • Developed a numerical algorithm that converts data between NURBS protocol and Bézier protocol

EDUCATION

Ph.D. in Mechanical Engineering at Georgia Institute of Technology, Atlanta, Georgia (GPA 3.90/4.00)
    Thesis: Statistical Analysis on Thermomechanical Dynamic Response of Explosive Composites
M.S in Mechanical Engineering at Seoul National University, Seoul, South Korea (GPA 3.91/4.00)
    Thesis: Molecular dynamics analysis of polymer flow in thermal-NIL process
B.S. in Mechanical Engineering, Pohang Univ. of Science and Technology (POSTECH), South Korea
    Graduated Magna Cum Laude (GPA 3.75/4.00)

PUBLICATIONS (shown since 2021 only) – h index of 17 from 844 citations total

1. P Fernandez-Zelaia, [and 6 others including **S. Kim**], Mechanical Behavior of Additively Manufactured Molybdenum and Fabrication of Microtextured Composites, *JOM*, V.74, (9), pp.3316-3328, 2022
2. B Bales, [and 5 others including **S. Kim**], Design and Use of a Penetrating Deposition Nozzle for Z-Pinning Additive Manufacturing, *SFF Proceedings*, 2022
3. B Seta, [and 6 others including **S. Kim**], Modelling of Additive Manufacturing-Compression Molding Process using CFD, *Proceedings of Advancing Precision in Additive Manufacturing*, 2022
4. B Seta, [and 6 others including **S. Kim**], Modelling Fiber Orientation During Additive Manufacturing-Compression Molding Processes, *SFF Proceedings,* 2022
5. A Hassen, [and 10 others including **S. Kim**], Anisotropic thermal behavior of extrusion-based large scale additively manufactured CF reinforced thermoplastic structures, *Polymer Composites,* V.43 (6), p.3678, 2022
6. E Jo, [and 8 others including **S. Kim**], The design of layer time optimization in large scale additive manufacturing with fiber reinforced polymer composites, *SAMPE proceedings*, 2022
7. R Spencer, [and 7 others including **S. Kim**], Volumetric nondestructive evaluation for damage in carbon fiber reinforced polymer panels subjected to artificial lightning strikes, *Proceedings of SPIE 12047*, 2022
8. D Pokkalla, [and 9 others including **S. Kim**], Characterization of anisotropic mechanical properties of polymer composites from a hybrid AM-CM process using x-ray CT, *Proceedings of SPIE 12047*, 2022
9. R Spencer, [and 5 others including **S. Kim**], Fiber orientation evaluation in reinforced composites using DIC and thermal excitation, *Composites Part B: Engineering 234, 109713*, 2022
10. B Bales, T Smith, **S Kim**, V Kunc, C Duty, Evaluating the Effect of Z-pinning parameters on the Mechanical Strength and Toughness of Printed Polymer Composite Structures, *Proceedings of Solid Freeform Fabrication Symposium (SFF)*, 2021
11. KMM Billah, [and 11 others including **S. Kim**], Large-Scale Additive Manufacturing of Self-Heating Molds, *Additive Manufacturing*, 102282, 2021
12. P Yeole, **S Kim**, AA Hassen, V Kumar, V Kunc, U Vaidya, Large-Scale Additive Manufacturing Tooling for Extrusion-Compression Molds, *Additive Manufacturing Letters*, 100007, 2021
13. M. Hsieh, C. Ha, Z. Xu, **S. Kim**, H. Wu, V. Kunc X. Zheng, Stiff and strong, lightweight bi-material sandwich plate-lattices with enhanced energy absorption, *Journal of Materials Research,* 2021.
14. S. Alwekar, R. Ogle, **S. Kim**, U. Vaidya, Manufacturing and characterization of continuous fiber-reinforced thermoplastic tape overmolded long fiber thermoplastic, *Composites Part B: Engineering,* 207, 108597, 2021
15. V. Kumar, [and 10 others including **S. Kim**], Internal arcing and lightning strike damage in short carbon fiber reinforced thermoplastic composites, *Composites Science and Technology,* 201, 108525, 2021
16. V Kumar, [and 11 others including **S. Kim**], High-performance molded composites using additively manufactured preforms with controlled fiber and pore morphology, *Additive Manufacturing* 37, 101733, 2021

SELECTED PRESENTATIONS (last presentations)

1. K. Billah, [and 6 others and **S. Kim**], "Thermal Analysis of Large Area Additive Manufacturing Resistance Heating Composites for Out of Oven/Autoclave Applications", ASME IMECE, online, Nov 2020.

PATENTS / AWARDS / SCHOLARSHIPS

Systems and methods for generating a graded lattice structure and their application to additive manufacturing (US Appl.#: 17 / 333,619 - pending)	*12/2021*
Long fiber injection molding (US Appl. #: 16/953,425 – pending)	*05/2021*
Continuous toolpaths for additive manufacturing (US Appl. #: 16/842,274 – pending)	*02/2021*
System and method for additive manufacturing with toolpath bridges and resultant structure (US Appl. #: 16/750,631 – pending)	*07/2020*
Self-sensing of printed polymer structures (US Appl. #: 16/539,184 – pending)	*02/2020*
Penetrating and actuating nozzle for extrusion-based 3d printing (US Appl.#: 16/135,548 -- pending)	*03/2019*
Outstanding Technical Paper Awards for SAMPE 2017, SAMPE conference, Seattle, WA	*05/2017*
Conference Award for Selected Student Presenters, nominated by the American Physical Society	*06/2015*