

# SOOYON CHANG

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## EDUCATION

Undergraduate: SUNY Korea 2018.02-2021.12  
GPA: 3.87/4.0

Master's Degree: Cornell University, ZT Group 2022.08-2024.05

Doctoral Degree in progress: Purdue University, Energy and Transport Sciences Laboratory (ETSL) 2024.08-current

## RESEARCH EXPERIENCE

### **Undergraduate research**

2020.07.01~2021.03.01

Research in Prof. Mark Whitaker's 130 Commodity ecology project, granted by NRF. Making published book and mobile platform in categorizing material and technology for each ecoregion. Researched Categories: Energy and Energy Storage (Graphene batteries, solid state batteries, hydrogen fuel cell, redox flow battery, molten silicon storage etc.)

2021.03-2021.12

Research Assistant for Prof. Brad Jongseong Choi. Hands on experience creating autonomous delivery vehicle using LiDAR SLAM, NVIDIA, and ROS navigation. Established the ROS operation by obtaining a costmap from 3D point clouds. Took responsibility in fixing frames and transforms to optimize the current position of the vehicle. Mapped entire campus using SLAM. Completed mechanical drawings(CAD) of the aluminum delivery box.

2021.09-2022.02

Research Assistant for Prof. Changwoon Han in joint with Hyundai Motor's Industrial-Academic consultant team to improve reliability of automotive parts. Researched about the reliability of the air-breather and its expected failure reasons, based on deactivation of defoamants. Suggested additional examinations of the bulk modulus inside transmission systems. Using Stress-Strength model, anticipated failure percentages of the newly designed air breather.

2022.01-2022.06

Research Assistant for Prof. Changwoon Han in joint with company Amotech. Industrial-Academic consultant team to improve reliability of MLCC by applying the homogenization method along with ANSYS simulation. Organized possible reasons for the changing properties of elastic modulus based on perovskite cell structure. Derived equations for the homogenization of periodic materials displacement (elastic modulus, coefficient of thermal expansion). Created a Matlab code that automates the calculation for homogenization of material properties.

2022.08-2024.05

## Graduate research

Zhiting Tian, helping with the project of building thermoelectric generators using organic films using waste heat (funded by The Department of Energy). Took lead role of researching the behaviors of n-type organic thin films and enhancing ZT value. Started from literature review in selecting film materials to synthesizing n-type films using carbon nanotubes, surfactants, and polymer doping. Devised hypothesis and checked how polymer aggregation affects the electrical conductivity of films. Optimized parameters for CNT solution and synthesized CNT composite films. Conducted various thin film characterization methods (Electrical conductivity measurements, surface profilometry, Seebeck coefficient measurements, SEM, Raman spectroscopy, TGA, XPS, Hall measurements)

Thesis: Enhancement of electrical conductivity in CNT networks for highly stable n-type thermoelectrics

Publication: S. Chang, P. Biswas, Z. Qin, Z. Tian, Unusual Electrical Conductivity Enhancement in Stable n-Type Carbon Nanotube Networks. *Small Methods* 2024, 2400585. <https://doi.org/10.1002/smt.202400585>

## TEACHING EXPERIENCE

### Undergraduate TA

SUNY Korea

2018.08.27.~2018.12.21

AMS 161, applied calculus 2

2020. 08.24-2020.12

AMS 261, applied calculus 3

## SCHOLARSHIPS AND AWARDS

### Undergraduate

Encouragement award (4 semesters), Academic excellence full tuition scholarship (2 semesters), Merit scholarship (1 semester)

2018-2021

SUNY Korea Project Expo Poster, MEC Departmental Winner for autonomous delivery vehicle, "Baero."

2021.06

Graduated with honor academic honor of Summa Cum Laude

2021.12

Selected as the valedictorian for 2021 Fall Graduation of SUNY Korea

2021.12

## CONFERENCES

2022.03.23-2022.03.25

KSME Spring Conference: Field of Reliability. Attended and presented a poster on, "Design and Validation for Enhancing the Reliability of Air Breather of Vehicle Transmission."

2023.11.26-2023.12.01

Materials Research Society conference, Electronics Optics and Photonics. Attended and presented a poster on carrier-doping behavior of n-type CNT films.

## TECHNICAL SKILLS

### **Software abilities**

Microsoft office(Excel, Word, Presentation), Python, CAD (Fusion 360, Autocad, NX),  
MATLAB, LabVIEW, ANSYS (Mechanical, Fluent)  
DFT and MD simulation (GAMESS, LAMMPS, Quantum Espresso)

### **Film Synthesis/Characterization Abilities**

Spin coating (Laurell), Drop casting and gas furnace annealing, Sonication (bath sonication,  
pen sonication)  
Centrifuge (Fisher Scientific), Profilometry analysis (Tencor Alpha Step, Keyence laser  
scanning microscope)  
Four point probe measurement (Cascade CPS 06), Seebeck coefficient measurements, SEM  
(Zeiss Gemini 500) and EDS, Raman microscope (WITec), Thermogravimetric analyzer  
(TGA), Xray Photoelectron Spectroscopy (XPS), Hall measurements