



# Chien-Cheng Hung, Ph.D.

My research interest lies in understanding the microphysical processes governing material deformation and failure under extreme conditions. During my PhD, I investigated fault mechanics and material behavior through a combination of experiments, microstructural analysis, and numerical modeling, gaining expertise in stress analysis, failure mechanisms, and material characterization. These insights are valuable for studying material reliability in semiconductor applications. I am detail-oriented and data-driven, committed to advancing materials research through microstructural insights and computational modeling.

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📍 Utrecht, the Netherlands

## Expertise

Material Characterization	Mechanical Property Analysis	Microstructural analysis	Thermo-Hydro-Mechanical Effects
Numerical Simulation	Machine Learning	Python Programming	Friction & Wear Testing

## Education

### PhD

Department of Earth Sciences / Utrecht University  
08/2019 – 02/2024  
The Netherlands

### MSc

Department of Earth Sciences / National Central University  
07/2015 – 07/2017  
Taiwan

### BSc

Department of Earth Sciences / National Central University  
09/2011 – 06/2015  
Taiwan

## Work Experience

### Postdoc researcher

Department of Earth Sciences / Utrecht University  
08/2024 - *present*  
The Netherlands

### Research assistant

Department of Earth Sciences / National Central University  
09/2018 – 07/2019  
Taiwan

## Achievements

- Led a laboratory research project on **high-pressure, high-temperature** rock deformation, overseeing **experiment design, execution, and data analysis**, resulting in new insights into **fault mechanics**.
- Performed **high-precision microstructural analysis** using **X-ray microscopy, SEM, and TEM** to characterize **material deformation**, contributing to improved understanding of **rock failure mechanisms**.
- Developed and implemented a **machine-learning-based image processing technique** for **X-ray microscopy analysis**, **reducing data processing time** and enhancing **image interpretation accuracy**.
- Built and validated a **3D discrete element method (DEM) model** to simulate **granular material deformation**, improving understanding of **fault dyanmic** and **failure mechanisms**.
- Mentored BSc and MSc students in **DEM modeling** and **triaxial rock deformation experiments**, enhancing their **research skills** and ensuring **experimental accuracy**.
- Collaborated with **international research teams** at **Utrecht University, University of Twente, INGV (Italy), and China Earthquake Administration** to enhance **experimental methodologies** and **cross-disciplinary research**.
- Collaborated in the **DeepNL** project, integrating **rock mechanics, numerical modeling, and microstructural analysis** to improve **earthquake risk assessment** and **geomechanical modeling**.

## Publications

- Hung, C. C.**, Niemeijer, A. R., Aretusini, S., Spagnuolo, E., Chen, J., & Hamers, M. (2025). Dynamic weakening in sandstone-derived fault gouges during simulated small-magnitude earthquakes under variable loading and environmental conditions. *Geophysical Journal International*, ggaaf077.
- Hung, C. C.**, Niemeijer, A. R., & Vasconcelos, I. (2024). Strain Localization in Sandstone-Derived Fault Gouges Under Conditions Relevant to Earthquake Nucleation. *Journal of Geophysical Research: Solid Earth*, 129(4), e2024JB028889.
- Hung, C. C.**, Niemeijer, A. R., Raoof, A., & Sweißen, T. (2023). Investigation of strain localization in sheared granular layers using 3-D discrete element modeling. *Tectonophysics*, 862, 229974.
- Kuo, L. W., **Hung, C. C.**, Li, H., Aretusini, S., Chen, J., Di Toro, G., ... & Sheu, H. S. (2022). Frictional properties of the longmenshan fault belt gouges from WFSD-3 and implications for earthquake rupture propagation. *Journal of Geophysical Research: Solid Earth*, 127(5), e2022JB024081.
- Hung, C. C.**, Kuo, L. W., Spagnuolo, E., Wang, C. C., Di Toro, G., Wu, W. J., ... & Hsieh, P. S. (2019). Grain fragmentation and frictional melting during initial experimental deformation and implications for seismic slip at shallow depths. *Journal of Geophysical Research: Solid Earth*, 124(11), 11150-11169.

## Languages

### Mandarin

Native or Bilingual Proficiency

### English

Full Professional Proficiency

### Dutch

Elementary Proficiency