








Chao ZHUANG, Ph.D.

 Google Scholar  Homepage
 <https://www.linkedin.com/in/cz4/>
 zhuang.chao95@gmail.com






Education

- 2020 – 2023  **Ph. D. in Materials Science & Engineering**, University of Tsukuba, Tsukuba, Japan.
- 2016 – 2019  **Master in Microelectronics & Solid State Electronics**, Sun Yat-sen University, Guangzhou, China.
- 2012 – 2016  **Bachelor in Materials Physics**, Sun Yat-sen University, Guangzhou, China.

Research Experience

- 2020 – 2023  **Ph.D. Candidate** with Prof. Genki Yoshikawa.
Materials Science & Engineering, University of Tsukuba, Tsukuba, Japan
Junior Researcher, National Institute for Materials Science (NIMS), Tsukuba, Japan
- Developed a Physical Vapor Deposition (PVD) protocol to fine-tune a MEMS sensor via mechanical nonlinearity, enabling zero stiffness and bistability for advanced sensing applications.
 - Constructed density-based topology optimization models to explore efficient MEMS sensor designs under various materials and design constraints.
 - Conducted Fluid-Structure Interaction (FSI) simulations to support the development of a PDMS-based microfluidic flow-sensing device.
- 2016 – 2019  **Graduate Student** with Prof. Huanjun Chen.
Microelectronics & Solid State Electronics, Sun Yat-sen University, Guangzhou, China
- Synthesized metal nanoparticles and exploited their optical properties using Raman spectroscopy, enabling in-vivo sensing applications in the near-infrared window.
 - Investigated metal nanoparticles' plasmonic properties through Finite Element Analysis (FEA) and the finite-difference time-domain (FDTD) method.

Skills




- Languages  Proficient in English, Mandarin, Cantonese, and Japanese; Beginner in French.
- Computer Skills  COMSOL, OpenFOAM, MATLAB, Python, R, Mathematica, \LaTeX , FDTD
- Technical Skills  Design of Experiments, Nanoindenter, Stylus Profilometer, Confocal Microscopy, Nanoindentation, Raman Spectroscopy, FTIR, UV-vis Spectroscopy, Dark-field Spectroscopy, SEM/EDS, PVD, TEM

Academic Experience

Awards and Achievements




- 2022  **Excellent Presentation Award in NIMS Student Joint Conference**, Issued by NIMS Global Program Office.

Conferences

- 2023  **MSS Partnership**, Poster Presentation.
-  **The 2nd Workshop on MSS Science & Technology**, Online Presentation.
- 2022  **NIMS WEEK**, Conference Attendance.

Academic Experience (continued)

Certifications

- 2023  **Experimentation for Improvement.** Awarded by Coursera.
 **Japanese Language Proficiency Test N1.** Awarded by the Japan Foundation.
- 2018  **TOEFL iBT, 103/120.** Awarded by ETS.

Publications

Journal Articles

- 1 K. Shiba*, **C. Zhuang**, K. Minami, G. Imamura, R. Tamura, S. Samitsu, T. Idei, G. Yoshikawa, L. Sun, and D. A. Weitz*, “Visualization of Flow-Induced Strain Using Structural Color in Channel-Free Polydimethylsiloxane Devices”, *Advanced Science* **10**, 2204310 (2023).
- 2 **C. Zhuang***, K. Minami, K. Shiba, and G. Yoshikawa*, “Linear Stiffness Tuning in MEMS Devices via Prestress Introduced by TiN Thin Films”, *ACS Applied Engineering Materials* **1**, 1213–1219 (2023).
- 3 **C. Zhuang***, K. Minami, K. Shiba, and G. Yoshikawa*, “Topology optimization for piezoresistive nanomechanical surface stress sensors in anisotropic $\langle 111 \rangle$ orientations”, *Nano Express* **4**, 035007 (2023).
- 4 Y. Xu, B. Zhou, **C. Zhuang**, J. Zhou*, H. Chen*, and S. Deng*, “High-Aspect-Ratio Plasmonic Heterostructures for In Vivo Enhanced Optical Coherence Tomography Imaging in the Second Near-Infrared Biological Window”, *Advanced Optical Materials* **8**, 2000384 (2020).
- 5 Y. Shen, H. Chen, N. Xu, Y. Xing, H. Wang, R. Zhan, L. Gong, J. Wen, **C. Zhuang**, X. Chen, X. Wang, Y. Zhang, F. Liu, J. Chen, J. She, and S. Deng*, “A Plasmon-Mediated Electron Emission Process”, *ACS Nano* **13**, 1977–1989 (2019).
- 6 **C. Zhuang**, Y. Xu, N. Xu, J. Wen, H. Chen*, and S. Deng*, “Plasmonic Sensing Characteristics of Gold Nanorods with Large Aspect Ratios”, *Sensors* **18**, 3458 (2018).
- 7 J. Wen, H. Wang, W. Wang, Z. Deng, **C. Zhuang**, Y. Zhang, F. Liu, J. She, J. Chen, H. Chen*, S. Deng*, and N. Xu*, “Room-Temperature Strong Light–Matter Interaction with Active Control in Single Plasmonic Nanorod Coupled with Two-Dimensional Atomic Crystals”, *Nano Letters* **17**, 4689–4697 (2017).

Preprint


- 1 **C. Zhuang***, K. Minami, K. Shiba, and G. Yoshikawa*, “Tailoring Stresses in Piezoresistive Microcantilevers for Enhanced Surface Stress Sensing: Insights from Topology Optimization”, in (arXiv e-prints, Aug. 1, 2023), preprint.

In Preparation


- 1 **C. Zhuang***, K. Minami, K. Shiba, and G. Yoshikawa*, “Topology optimization of piezoresistive nanomechanical sensors with integrated readout for enhanced surface stress sensing”, (2023).

References


Prof. Dr. Genki Yoshikawa

Full Professor, Ph. D. Supervisor
National Institute for Materials Science
University of Tsukuba
 yoshikawa.genki@nims.go.jp


Dr. Kota Shiba

Principal Researcher, Colleague
National Institute for Materials Science
 shiba.kota@nims.go.jp

Prof. Dr. Huanjun Chen

Full Professor, Master Supervisor
Sun Yat-sen University
 chenhj8@mail.sysu.edu.cn

Dr. Kosuke Minami

Senior Researcher, Colleague
National Institute for Materials Science
 minami.kosuke@nims.go.jp