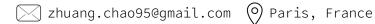
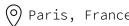
# Chao ZHUANG

Ph.D. in Materials Science & Engineering









## RESEARCH EXPERIENCE

### Thin Film Process for MEMS Sensors Augmentation

2021 - 2022 | National Institute for Materials Science (NIMS), Tsukuba, Japan

- → **Technology Development:** Developed a Physical Vapor Deposition (PVD) protocol for MEMS sensor fabrication, yielding a six-fold improvement in sensor performance utilizing mechanical nonlinearity.
- → Sensor Testing: Established an automated mechanical test leveraging nanoindentation, effectively standardizing MEMS sensor characterization, reducing sample variations, and streamlining the test cycle.
- → Finite Element Analysis (FEA): Performed nonlinear mechanical analysis based on reduced order models and FEA, deriving critical specifications for methodology development.
- → Characterization: Undertook thorough thin-film quality evaluation using SEM, wafer inspection, and stylus profilometry, facilitating metrology feedback for methodology refinement.
- → Data Analysis: Analyzed data from a 12-channel sensor system, classifying seven agricultural samples via Principle Component Analysis (PCA) for odor-detection applications.

# **MEMS Sensors Optimization via Generative Design Methods**

2022 - 2023 | National Institute for Materials Science (NIMS), Tsukuba, Japan

- → **Design Optimization:** Constructed density-based topology optimization models to enhance sensor performance, yielding innovative designs with a 30% performance boost within existing fabrication frameworks.
- → Script Automation: Automated the optimization workflow with MATLAB parallelization, saving over 400 man-hours and tripling optimization throughput, remaining within budgetary constraints.
- → **Documentation:** Established a comprehensive workflow reference, fostering a culture of knowledge sharing and collaborative learning within the laboratory.

# Flow Visualization Using Structural Color in Wrinkled Microfluidic Devices

2021 – 2022 | National Institute for Materials Science (NIMS), Tsukuba, Japan

- → Cross Functional Collaboration: Conducted nonlinear mechanical analysis in the cross-functional team for a novel microfluidic device, providing theoretical insights crucial to device design and manuscript preparation.
- → Multiphysics Modeling: Applied Fluid-Structure Interaction (FSI) simulations via FEA for experiment validation under six different gases and varying testing conditions.

# SELECTED PUBLICATIONS

- → **Zhuang C.** et al. Linear Stiffness Tuning in MEMS Devices via Prestress Introduced by TiN Thin Films, ACS Applied Engineering Materials, 2023, 1 (4), 1213
- → Shiba K. **Zhuang C.** et al. Visualization of Flow-Induced Strain Using Structural Color in Channel-Free Polydimethylsiloxane Devices, Advanced Science, 2023, 10 (1), 2204310



# SKILLS

#### **TECHNICAL SKILLS**

- Design of Experiment
- Project Management
- Technology Research
- Root Cause Analysis
- Confocal Microscopy
- Nanoindentation
- Inkjet Spotter
- SEM/EDS
- Raman
- PVD
- TEM

#### **COMPUTER SKILLS**

COMSOL • MATLAB • R Python • OpenFOAM Mathematica • LaTex

#### **LANGUAGES**

English • Mandarin Cantonese • Japanese

#### AWARDS

Secured 1st place for exceptional presentation skills in English among 40 masters and Ph.D. students at academic seminars hosted by NIMS.

#### **EDUCATION**

#### UNIVERSITY OF TSUKUBA

Ph.D. IN MATERIALS SCIENCE & Engineering 2020 - 2023 | Tsukuba, Japan

#### SUN YAT-SEN UNIVERSITY

MASTER IN MICROELECTRONICS & SOLID STATE ELECTRONICS 2016 - 2019 | Guangzhou, China Cum. GPA: 3.3 / 4.0

#### SUN YAT-SEN UNIVERSITY

BACHELOR IN MATERIALS PHYSICS 2012 - 2016 | Guangzhou, China Cum. GPA: 3.6 / 4.0