

Meng YIN

PHD STUDENT, GRADUATE SCHOOL OF ENGINEERING, TOHOKU UNIVERSITY

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Education

Tohoku University

Sendai, Japan

PHD ENGINEERING

2022.10 - present

- Advisor: Prof. Ken SUZUKI

Tohoku University

Sendai, Japan

MS ENGINEERING

2020.10 - 2022.09

- Advisor: Prof. Ken SUZUKI

East China University of Science and Technology

Shanghai, China

BS ENGINEERING

2016.09 - 2020.06

- Undergrad research advisor: Dr. Ya-bin YAN

Research Experience

Tohoku University - Dept of Finemechanics

Sendai, Japan

CO-ADVISORS: PROF. KEN SUZUKI, PROF. HIDEO MIURA

Oct. 2020 - Present

- **Project: Development of a multi-gas sensor using strain-controlled graphene and its application to health monitoring**
 - Strain effect on graphene gas adsorption properties was studied by DFT calculation
 - Clarified the mechanism of the effect of strain on the gas adsorption performance of graphene
 - Proposed a novel method to improve graphene selectivity performance by strain control
 - The strain-effect was then experimentally validated by using LPCVD graphene on a polyimide substrate
- **Keywords:** Graphene; DFT; Gas Adsorption; Strain; LPCVD; Flexible Electronics

University of China University of Science and Technology - Dept of Mechanical Design and Manufacturing and its Automation

Shanghai, China

ADVISORS: DR. YA-BIN YAN

Jun. 2019 - Jun. 2020

- **Thesis:** Design of 3D processing fixture and in-situ testing mechanism for micro/nano samples.
 - Single-crystal Si specimens were fabricated using focused ion beam (FIB) and modeled using ABAQUS package
 - Fracture toughness was evaluated using critical distance theory (TCD)
 - Fracture behavior was simulated using the cohesive zone model (CZD)
- **Keywords:** Silicon; Crack; FIB; FEA

Publications

JOURNAL PAPER

M. Yin, X.Y. Qiao, L. Wang, K. Suzuki*, H. Miura, "Strain-modulated adsorption of gas molecule on graphene: first-principles calculations", Submitted to Diamond and Related Materials (Under review)

L. Wang, Y.N. Sun, X.D. Wei, **M. Yin**, Y. Chen, H. Miura and C. Wang, "The uniaxial zero thermal expansion and zero linear compressibility in distorted prussian blue analogue RbCuCo(CN)6", Submitted to Physical Chemistry Chemical Physics (Under review)

X. Wang, M. Xiang, **M. Yin**, Y.B. Yan*, F.Z. Xuan*, "From continuum to quantum mechanics study on the fracture of nanoscale notched brittle materials", International Journal of Mechanical Sciences, 199: 106402, 2021.

PEER-REVIEWED CONFERENCE PROCEEDINGS

M. Yin*, X.Y. Qiao, K. Suzuki, H. Miura, and L. Wang, "Control of the adsorption behavior of gas molecule on graphene by strain: First-principles calculations for development of multi-gas selective sensors", Prof. of International Conference on Simulation of Semiconductor Processes (SISPAD 2023).

- X.Y. Qiao, **M. Yin**, K. Suzuki, and H. Miura, "Improvement of sensitivity and selectivity of graphene-based gas sensor by strain", Proc. of ASME International Mechanical Engineering Congress and Exposition (IMECE 2023). (Accepted)
- M. Yin***, X.Y. Qiao, Q.Q. Zhang, L. Wang, and K. Suzuki, "Strain-induced Change of Adsorption Behaviour of Gas Molecules on Graphene Analyzed by Density Functional Method", Proc. of ASME International Mechanical Engineering Congress and Exposition (IMECE 2022), vol. 12 (2022)

Presentations

**presenting author*

INTERNATIONAL CONFERENCE

- M. Yin***, X.Y. Qiao, L. Wang, K. Suzuki, and H. Miura, "Strain control of the adsorption energy of NO₂ molecule on graphene: first-principles calculation for development of selective multi-gas sensors", 33rd International Conference on Diamond and Carbon Materials, 10-14 September 2023, Palau de Congressos de Palma, Mallorca, Spain.
- M. Yin***, X.Y. Qiao, K. Suzuki, L. Wang, and H. Miura, "Effect of strain modulation on gas molecule adsorption on graphene using first-principles calculations", 2023 International conference on solid state device and materials, 5-8 September 2023, Nagoya, Japan.
- M. Yin***, X.Y. Qiao, Q.Q. Zhang, L. Wang, and K. Suzuki, "Strain-induced Change of Adsorption Behaviour of Gas Molecules on Graphene Analyzed by Density Functional Method", Proc. of ASME International Mechanical Engineering Congress and Exposition, November 3rd, 2022, Columbus, OH, USA.
- M. Yin***, K. Suzuki, and H. Miura, "Strain-induced Change of Adsorption Behaviour of Gas Molecules on Graphene: A first-principles Study", 15th World Congress on Computational Mechanics (WCCM-XV, 2022.7.31 8.5).
- M. Yin***, Q.Q. Zhang, K. Suzuki, and H. Miura, "First Principles Analysis on the Strain-Induced Variation of Adsorption Behavior of Gas Molecules on Graphene", ASME Verification, Validation, and Uncertainty Quantification Symposium (VVUQ2022, 2022.5.25 26), No. 88370.

DOMESTIC CONFERENCE

- M. Yin***, X.Y. Qiao, L. Wang, K. Suzuki and H. Miura, "First-principles Study on Strain-induced Change of Adsorption Behaviors of NO₂ Molecules on Graphene", The 70th JASP Spring Meeting 2023 (Sophia University, 2023.3.15 18).
- M. Yin***, X.Y. Qiao, Q.Q. Zhang, K. Suzuki, H. Miura, "First-Principles Operation Analysis of Strain-Induced Gas Molecular Adsorption Behavior Controlled Gas Selective Sensor on Graphene", JSME Annual Conference 2022 (University of Toyama, 2022.9.11 14).
- M. Yin***, Q.Q. Zhang, K. Suzuki, H. Miura, First-principles analysis of the effect of strain on the adsorption properties of gas molecules on graphene," Proceedings of the 57th Annual Meeting of Tohoku Branch of the Japan Society of Mechanical Engineers, Tohoku University, 2022.3.11, No.140, pp.40-41.
- M. Yin***, X.Y. Qiao, Q.Q. Zhang, K. Suzuki, H. Miura, "First-principles analysis of strain dependence of adsorption/desorption properties of gas molecules on graphene", Proceedings of the 34th Conference on Computational Mechanics (CMD2021, 2021.9.21 23, Sapporo), No.21-36, pp.012.

Awards, Fellowships, & Grants

2023.04- 2026.04	JSPS Research Fellowship for Young Scientists DC1 , Japan Society for the Promotion of Science	JPY 2,700,000
2022.10- 2023.04	Advanced Graduate School Pioneering Research Support Project for PhD Students , Tohoku University	JPY 500,000
2022.2	Best Young Researcher Award , JSME Computer Mechanics Division Conference (CMD2021)	
2021.10- 2025.09	Tohoku University Graduate Program for Integration of Mechanical Systems (GP-MECH) , Tohoku University	
2020.10- 2022.09	Monbukagakusho Scholarship (MEXT)/Japanese Government Scholarship , Ministry of Education, Culture, Sports, Science and Technology, Japan	