Wanzhen He

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Education

Tsinghua University, Beijing, China *Sep. 2017 - present*

- **Ph.D. in Solid Mechanics** (expected in July 2022)
- Advisor: Prof. Zhiping Xu
- Overall GPA: 3.7/4.0

Tsinghua University, Beijing, China *Sep. 2013 - Jul. 2017*

- **B.Eng. in Engineering Mechanics**
- Overall GPA: 87.5/100
- Double major in economics

Research Interest

Growth and Etching Dynamics of Low-dimensional Materials

Explore the competitive growth and etching dynamics of low-dimensional materials through both theoretical analysis and computational simulations. Experimental phenomenon during the synthesis process has been investigated, which promotes the optimization of both quality and efficiency of as-grown products. Current studies include graphene (DFT, phase-field, and level-set models), h-BN (kinetic Wulff construction, DFT, phase-field, and kinetic models), and $MoSe_2$ (DFT and kinetic models).

Single-particle Irradiation Effect in Low-dimensional Materials and Structures

Explore the single-particle irradiation effect in the low-dimensional materials and structures through multi-scale simulation methods. Current studies include defect production and irradiation mechanism of SiC nanowires under ion beam (MD), electronic excitation effect of graphene under proton irradiation (TDDFT), current responses of graphene transistors under proton irradiation (TDDFT-OS).

Publications and Projects

Journal Publications

†: equal contribution, *: corresponding author

[1] **W He**, C Yam*, Z Xu*, Transient current in graphene transistors under single-proton irradiation (In revision, ***Communication Physics***).

[2] **W He**, C Chen, Z Xu*, Electronic excitation in graphene under single-particle irradiation. ***Nanotechnology***, 32(16), 165702 (2021).

[3] **W He**, C Chen, Z Xu*, Molecular dynamics simulations of silicon carbide nanowires under single-ion irradiation. ***Journal of Applied Physics***, 126(12), 125902 (2019).

[4] **W He**, D Geng, Z Xu*, Pattern evolution characterizes the mechanism and efficiency of CVD graphene growth. ***Carbon***, 141, 316-322 (2019)

[5] H Liu†, **W He**†, Z Liu, I Abidi, Y Ding, P Galligan, M Tamtaji, J Li, Y Cai, T Kang, H Wong, Z Li, P Zhao, Z Gao, Y Mi, Z Xu*, Z Luo*, Structure evolution of hBN grown on molten Cu by regulating precursor flux during chemical vapor deposition. ***2D Materials***, 9, 015004 (2022).

[6] Q Zhang†, **W He**†, Z Xu, L Li, D Geng*, W Hu*, Oxygen-assisted anisotropic chemical etching of $MoSe_2$ for enhanced phototransistors (In submission).

[7] M Huang, **W He**, Z Xu, H Zhu*, Enhanced catalytic mechanism of twin-structured $BiVO_4$. ***The Journal of Physical Chemistry Letters***, 12, 10610–10615 (2021).

[8] L Cai, **W He**, X Xue, J Huang, K Zhou, X Zhou, Z Xu*, G Yu*, In situ growth of large-area and self-aligned graphene nanoribbon arrays on liquid metal. ***National Science Review***, nwaa298 (2020).

[9] J Yang, **W He**, Q Jiang, Z Chen, H Ju, X Xue, Z Xu*, P Hu*, G Yu*, Hydrogen-dominated metal-free growth of graphitic-nitrogen doped graphene with n-type transport behaviors. ***Carbon***, 161, 123-131 (2020).

Conferences

- The 16th National Conference on Physical Mechanics, 2021, *Graphene Electronics under Single Particle Irradiation* (Oral).
- The 19th International Conference on the Science and Application of Nanotubes and Low-dimensional Materials (NT18), 2018, *Pattern Evolution Characterizes the Mechanism and Efficiency of CVD Graphene Growth* (Poster).

Projects

[1] Structural Health Monitoring under Complex Irradiation Equipment. *The Science Challenge Project*, No. TZ2018007 (2018-2019), 1.2 million CNY. My role is to investigate the radiation effect under long-term and low-dose irradiation environment.

[2] National Natural Science Foundation of China: Solid Mechanics. *National Natural Science Foundation of China*, No. 11825203 (2019-2023), 3.5 million CNY. My role is to explore the competitive growth and etching dynamics of graphene synthesis.

Awards

Qinghua Du Scholarship, Tsinghua University *2017-2018*

Academic Scholarship, Tsinghua University *2016-2017*

Volunteer Scholarship, Tsinghua University *2015-2016*

Teaching Experience

Teaching Assistant, Tsinghua University *Spring 2021*
Mechanics of Materials.

Software and Technical Strengths

(TD)DFT calculation	VASP, SIESTA, DFTB+, LODESTAR, GPAW, PWMAT, QBALL, TDAP
MD Simulation	LAMMPS, GULP
Continuum simulation	ABAQUS, MOOSE, Fenics
Programming	Python, Fortran, Matlab, C++