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多尺度力学-医学交叉实验室，航天航空学院，西安交通大学

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工作经历

- 2022.9 – 至今，助理教授，西安交通大学青年优秀人才 A 类
  团队：刘益伦 教授 国家杰青 “多尺度力学-医学交叉实验实”、“复杂服役环境重大装备结构强度与寿命全国重点实验室”。

教育背景

- 2018.3 – 2022.3，博士
  固体力学，多尺度力学-医学交叉实验室，西安交通大学
- 2020.1 – 2021.3，访问学者
  力学，地球与环境工程系，哥伦比亚大学
- 2016.9 – 2018.3，硕士
  固体力学，国际应用力学中心航天航空学院，西安交通大学
- 2012.9 – 2016.7，本科
  飞行器设计与工程，航天航空学院，西安交通大学

研究方向

- **先进材料多尺度力学建模与优化设计**
  发展类贝壳等仿生复合结构连续介质力学模型；
  构建考虑复杂服役环境的疲劳相场断裂模型；
  提出多尺度优化设计方法指导碳纳米复合材料强韧化设计。
- **基于深度生成模型的材料智能化设计专家平台**
  开发层状晶体力学行为计算软件包 LayerMech 实现功能导向高通量搜索；
  建立面向各领域知识（二维材料、点阵结构等）的智能设计专家平台；
  基于扩散大语言生成模型实现晶体、力学超材料的逆向设计。
- **力学知识驱动的自然语言模型**
  构建晶体语言实现全周期表功能无机固体材料智能设计；
  构建力学描述语言实现复杂三维点阵结构力学行为逆向设计；
  构建几何描述语言实现文本-CAD 智能生成。

科研项目

- **国家自然科学基金青年项目**；项目号：12302140，30 万，2024.1 至 2026.12，考虑环

境效应的二维材料力学建模与构象调控，主持

- **中国博士后基金面上项目；**项目号：2023M732794，8 万，2023.7 至 2024.12，环境交互作用下二维大分子的力学模型与构象演化行为研究，主持
- **中央高校基金；**项目号：sxzy012023213，10 万，2023.1 至 2025.12，基于原子信息的二维材料断裂与疲劳机理研究，主持
- **国家资助博士后研究人员计划 B 档；**项目号：GZB20230575，36 万，2024.1 至 2026.12，基于原子信息的二维材料断裂与疲劳机理研究，主持
- **西安市科协青年人才托举计划项目**；考虑服役环境的仿生复合材料断裂和疲劳行为理论建模与优化设计，主持
- **陕西省杰出青年项目；**项目号：2023JC-XJ-02，50 万，2022.1 至 2024.12，碳纳米及其复合材料多尺度力学研究，参与
- **JG 项目；**项目号：J202208005，33 万，2022.9 至 2023.1，XXX 设计，参与
- **横向课题**；29 万；2022.9 至 2023.3，新型防阻块高速冲击载荷下优化设计，参与

期刊论文

共发表 SCI 论文 37 篇，其中第一或通讯作者在 J. Mech. Phys. Solids（3）、Eng. Fract. Mech.、Nat Commun.、Nano Lett.（2）等期刊发表 SCI 论文 19 篇。

【第一/共一/通讯】

[1] **Chen Y**, Liu H, Pang K, Zhang C, Qin H, Xu Z, Liu Y. Bending deformable tension-shear model for nacre-like composites[J]. Journal of the Mechanics and Physics of Solids, 2023, 171: 105132.

[2] **Chen Y**, Qin HS, Liu YL, Liu HC, Shui LQ, Liu YL and Chen Xi. Extended Deformable Tension-Shear Model for Graphene Layered Materials with Non-uniform Staggering[J]. Journal of the Mechanics and Physics of Solids, 2022. 159: 104728.

[3] **Chen Y**, Ouyang WG, Zhou Ke, Liu HC, Qin HS, Liu YL. Finite temperature mechanics of multilayer 2D materials [J]. Extreme Mechanics Letters, 2022: 101612.

[4] **Chen Y**, Wan J, Chen Y, Qin H, Liu Y, Pei QX, Zhang YW. The dual role of interlayer crosslinks leads to an abnormal behavior of interlayer thermal resistance in multilayer graphene[J]. International Journal of Thermal Sciences, 2023, 183: 107871.

[5] **Chen Y**, Qin HS, Song JZ, Liu ZM, Pei QX, and Liu YL. Exploring the structure–property relationship of three-dimensional hexagonal boron nitride aerogels with gyroid surfaces[J]. Nanoscale, 2020, 12(18): 10180-10188.

[6] **Chen Y**, Xiao H, Liu YL and Chen X. Effects of temperature and strain rate on mechanical behaviors of Stone–Wales defective monolayer black phosphorene[J]. The Journal of Physical Chemistry C, 2018, 122(11): 6368-6378.

[7] **Chen Y**, Shi XY, Li MJ, Liu YL, Xiao H and Chen X. Strain and defect engineering on phase transition of monolayer black phosphorene[J]. Physical Chemistry Chemical Physics, 2018,20, 21832-21843.

[8] **Chen Y**, Liao XB, Shi XY, Xiao H, Liu YL and Chen X. Three-dimensional auxetic

properties in group V–VI binary monolayer crystals X3M2 (X= S, Se; M= N, P, As)[J]. Physical Chemistry Chemical Physics, 2019, 21(11): 5916-5924.
[9] **Chen Y**, Wang XR, Liu YL, Xiao H and Chen X. Effect of Local Terrace on Structure and Mechanics of Graphene Grain Boundary[J]. The Journal of Physical Chemistry C, 2019, 123 (46), 28460-28468.
[10] **Chen Y**, Qin HS, Liu YL, Pei QX and Zhang YW. Modeling and Analysis of the Geometry‐Dependent Mechanical and Thermal Properties of Coiled Carbon Nanotubes[J]. physica status solidi (RRL)–Rapid Research Letters, 2021: 2100360.
[11] Xiao H, Li R, Shi X, **Chen Y**, Zhu L, Chen X and Wang L. An invertible, invariant crystal representation for inverse design of solid-state materials using generative deep learning[J]. Nature Communications, 2023, 14(1): 7027.
[12] Wang L, Wang B, Wang Z, Huang J, Li K, Liu S, Lu J, Han Z, Gao Y, Cai G, Liu YJ, **Chen Y**, Lin Y, Liu Y, Gao C, and Xu Z. Superior strong and tough nacre-inspired materials by interlayer entanglement[J]. Nano Letters, 2023, 23(8): 3352-3361.
[13] Wang L, Li K, Chen F, Guo R, Zhao Y, Liu S, Zhang Y, Li Z, Shen C, Wang Z, Ming X, Liu YJ, **Chen Y**, Liu Y, Gao C, and Xu Z. High Performance Nacre Fibers by Engineering Interfacial Entanglement[J]. Nano Letters, 2024.
[14] Kang K, **Chen Y**, Hou J, Liu Y. Fracture behaviors of nacre-like composites via phase-field fracture modeling[J]. Engineering Fracture Mechanics, 2024, 296: 109837.
[15] Zhang G, Liu H, **Chen Y**, Qin H, Liu Y. Strength criterion of graphene GBs combining discrete bond strength and varied bond stretch[J]. Journal of the Mechanics and Physics of Solids, 2022, 169: 105080.
[16] Liu S, **Chen Y**, Zhang G, Liu Y. Tunable wrinkle patterns in Moiré pattern of interlayer-bonding strained bilayer graphene[J]. Applied Surface Science, 2024, 657: 159792.
[17] Liu S, **Chen Y**, Liu Y. In-plane and interlayer mechanical behaviors of diamane superlattice generated in twisted bilayer graphene[J]. Journal of Applied Physics, 2022, 132(23).
[18] Liu LX, **Chen Y**, Dang F, Liu YL, Tian XG and Chen X. Synergistic effect of supercritical CO2 and organic solvent on exfoliation of graphene: experiment and atomistic simulation studies[J]. Physical Chemistry Chemical Physics, 2019, 21(39): 22149-22157.
[19] Yang PF, **Chen Y**, Chen YL and Dang F. Gyro-free inertial measurement unit with unfettered accelerometer array distribution and for the object with position change in center of gravity[J]. IEEE Sensors Journal, 2021, 21(7): 9423-9435.

【合作论文】

[20] Zhang G, **Chen Y**, Yue S, et al. A unified strength criterion for two-dimensional materials via bond failure analysis[J]. Journal of the Mechanics and Physics of Solids, 2023, 181: 105466.
[21] Zhao Z, Li D, Yan X, **Chen Y**, Jia Z, Zhang D, Han M, Wang X, Liu G, Liu X, Liu S. Insights into the dual effects of Ti on the grain refinement and mechanical properties of hypoeutectic Al–Si alloys[J]. Journal of Materials Science & Technology, 2024, 189: 44-59.
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Zhou X. Shape and Stiffness Switchable Hydroplastic Wood with Programmability and Reproducibility[J]. ACS nano, 2023, 17(23): 23524-23534.
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其他成果

[1] 陈炎, 张国强, 张嘉诚, 刘益伦. 层状晶体力学行为计算软件[简称：LayerMech] V1.0, 登记号: 2021SR2076272. 2021-12-17.

[2] 宋居正, 陈炎, 陈曦, 闫渊. 一种壳聚糖基二氧化碳吸附气凝胶的制备方法[P]. CN107952415A, 2018.04.24.

[3] 宋居正, 陈炎, 陈曦, 闫渊. 一种高效连续二氧化碳循环捕集材料及制备方法[P]. CN106268708A, 2017.01.04.

学术会议

[1] 2021 年四校航空航天及力学学术论坛, 19-21 June 2019, 中国

[2] 3th international nanoscience student conference /X-Idea Workshop, 15-18 July 2019, China

[3] 18th U.S. National Congress for Theoretical and Applied Mechanics, 05-09 June 2018, USA