Dr. Wei Tan

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Summary

Dr. Wei Tan is a Reader in Mechanics of Materials at Queen Mary University London. His research interests lie in three key areas: (1) **Multiscale material characterisation**, using TEM, SEM, EDX, optical micromicroscopescpe, X-ray CT scan, nanoindentation and spectroscopy for multiscale material characterisation; (2) **Multiscale computational design of materials** techniques to design lightweight composite materials from nanoscale to macroscale, molecular dynamics, phase field method, continuum mechanics; (3) **Data-driven methods for characterisation and modelling**, using AI to automate image analysis and feature extraction, leveraging machine learning method to design and optimise materials across various scales, enhancing their performance and functionality from material-level to structure-level applications. He has published over 40 papers in leading journals related to the mechanics of materials ($\sim$ **2800 citations, H-index 24**, Google Scholar). He has secured around £1.8m research grants as PI, such as the **ERC Starting Grant/UKRI Frontier Research**, **EPSRC New Investigator Award**, Royal Society Research Grant. Other recognitions include 2024 ESCM Young Researcher Award, Cambridge CAPE BlueSky Research Award, Royal Aeronautical Society Bronze Award and over 20 invited talks (ECCM21 Plenary talk, Cambridge, Imperial College, Durham, etc.). He was also featured among **World's Top 2% Scientists** by Stanford University in 2023 and 2024 (Materials).

Education

Queen's University Belfast (QUB) — Belfast, UK
PhD in Mechanics of Composites — *Oct. 2012 – Feb 2016*

Central South University (CSU), Top 25 universities in China — Changsha, China
Master in Mechanical Engineering, transferred to PhD — *Sep. 2011 – July 2012*

Central South University, 985/211 project universities — Changsha, China
Double bachelor degrees in Mechanical Engineering and Physics (Top 1%) — *Sep. 2007 – July 2011*

Research Experience

Reader (2024), Senior Lecturer (2022), Lecturer (2020) — Jan. 2020 – Present
Queen Mary University of London (QMUL) — *London, UK*

- Data-driven characterisation and modelling of engineering materials and structures.
- Multiscale computational modelling the failure of engineering materials and structures.
- Mechanics of multifunctional composite materials for energy-storage.
- Mechanics of cellular composites for crash energy absorption.

Research Associate, Advisor: Prof. Norman Fleck (FRS, FREng) — June 2016 – Dec. 2019
University of Cambridge — *Cambridge, UK*

- Manufactured new direct-spun carbon nanotube (CNT) mat polymer composites with various composition.
- In-situ characterisation of mechanical, electrical and thermal properties of CNT mat-epoxy composites.
- Proposed a new micromechanical model for CNT mat-epoxy composites.

- Developed and investigated novel CNT-polyaniline structural supercapacitor, collaborating with Prof. Michael De Volder

Visiting Researcher, Supervisor: Prof. Javier Llorca (FEMS) March. 2016 – June. 2016
IMDEA Material Institute *Madrid, Spain*

- Characterisation of the microscale interfacial strength of fibre-reinforced composites.
- Developed a multi-scale computational model for fibre-reinforced composites.

PhD candidate, Supervisor: Prof. Brian Falzon (FRAes) Oct. 2012 – June. 2016
Queen's University Belfast *Belfast, UK*

- Virtual testing and design of composite aerostructures under impact and crush loading.
- Developed a high-fidelity computational model for the non-linearity of fibre-reinforced composites.

Grants from Research Councils

Principal Investigator Feb. 2016 – Present

- LSIMPACT: Life-like Resilient Materials for Mitigating Liquid-Solid Impact Damage, **ERC Starting Grant/UKRI Frontier Research**, £1.3m, EP/Y037103/1, 2024-2029, EU/UK
- CELLCOMP: Data-driven Mechanistic Modelling of Scalable Cellular Composites for Crash Energy Absorption, **EPSRC New Investigator Award**, Grant NO. EP/V049259/1, 2022-2025, £392k, UK
- Decoding the Material Degradation Mechanisms Under High-velocity Liquid-solid Impact Loadings, **Royal Society Research Grant**, Grant NO. RGS131417, 2023-2025, £70k, UK
- From Lab to Field: Developing Resilient Coating Materials for Rain Erosion Protection in Wind Turbine Applications, funded by Henry Royce Institute/EPSRC, **Royce Industrial Collaboration Programme**, Grant NO. EP/X527257/1, 2025-2026, £100K, UK
- Structural supercapacitors using hybrid carbon fibre/carbon nanotube composites, funded by University of Cambridge, CAPE Acorn Blue Sky Research Award, Grant NO. NMZD/256, 2017-2018, £20k, UK

Co-Investigator April 2020 – Present

- Thermal-mechanical modelling of graphene-related composite materials, Graphene Flagship Core Project 3, funded by EU Commission - Horizon 2020, No. 881603, 2020-2023, £376K, EU

Industry funded projects

Principal Investigator Feb. 2022 – Present

- Nippon Sheet Glass (NSG) Group, Development of new composite package materials for sheet glass, £28k, June-August 2022. The project was highly successful, and we jointly filed a **patent** (No. 2314036.1).

- Reading Scientific Services Ltd (RSSL), Research project on characterisation of the fracture toughness of new recyclable polymer package materials, £18k, Feb-March 2023

Award and Honour

Research and Educational activities

- **ERC Starting Grant**, 2024
- European Society of Composite Materials **(ESCM) Young Researcher Award**, 2024
- **EPSRC New Investigator Award**, 2022
- Ranked in the **World Top 2% Scientists** in the most cited scientists in Materials (single year) 2023 and 2024, Elsevier Data Repository, V6, doi: 10.17632/btchxktzyw.6
- Research Excellence Award, QMUL, UK, 2023

- Student Experience and Education Award, QMUL, UK, 2022
- Bronze Award, Written Paper Prize, Royal Aeronautical Society, UK, 2018
- Cambridge engineering department photo competition, SEM prize, UK, 2017
- Second best research poster in Sir Bernard Crossland Competition, UK, 2013

Extracular activities

- Outstanding graduate student, Central South University, China, 2011
- First prize of Mechanical Innovative Design Competition of Hunan province (Team leader), China, 2010
- Internship at Sany Co., Ltd. (3rd-largest heavy equipment manufacturer in the world), China, July 2010–Sep.2010
- First-class scholarship for the academic year, CSU, China, 2007-2011

Editorial Board

- Frontiers in Mechanical Engineering, **Associate Editor** for Solid Mechanics Section Jan. 2021 – Present
- Polymers, Topic Editor Jan. 2021 – Present

Membership of Professional Bodies

- **Executive Board member** of UK Association for Computational Mechanics Jan. 2021 – Present
- Organiser committee member of International Conference on Composite Materials 2021 Sep. 2020 – Present
- Professional Member of Institute of Materials, Minerals and Mining (IoM3) Sep. 2021 – Present
- Fellow of Higher Education Academy Sep. 2022 – Present
- Member of European Mechanics Society Aug. 2018 – Present
- Member of Royal Aeronautical Society Oct. 2012 – Present
- President of Student Branch of AIAA Belfast Sep. 2013 – Sep. 2015

Teaching

Computational and Mathematical Modelling 1, Lecturer, 520+ 1st-year UG Sep. 2021 – Present

- Integrate Math, Statics and Python to deliver a student-centred, open-ended active learning experience.

Failure of Materials, Lecturer, 150+ 3rd-year UG and MSc students Jan. 2020 – Present

- Teach students the failure mechanisms including plasticity, fracture, fatigue and creep.

Final year group project, Lecturer, 20+ 3rd-year UG students Sep. 2023 – Present

- Design and modelling of composite materials for wind turbine applications

Ceramics, Lecturer, 120+ 4th-year UG students at QMUL-NPU institute Oct. 2020 – Present

- To allow students to understand and analyse the mechanical properties of ceramics materials.

Materials, Tutor, Two 2nd-year students at Cambridge Sep. 2016 –Dec. 2017

Mechanics of composite materials, Tutor, 50 3rd-year UG students, QUB Jan. 2012 – May 2015

Reviewer

- Grant application reviewer: EPSRC standard grants, Polish National Science Centre
- Journals: Composite Science and Technology, Composite Part A, Composite Part B, International Journal of Impact Engineering, Journal of Composite Materials, Thin-walled structure, Journal of the Mechanics and Physics of Solids, etc
- Elsevier book: Damage Analysis of Composites

Leadership role and outreach activities

- SEMS Chair of Computing Committee at QMUL, 2023 – Present
- SEMS Outreach Academic Lead at QMUL, 2022 – 2024
- Presenter at 1st Belfast Science Festival, Mar. 2015

Conference and symposium activities

- **Conference Joint Chair** for UK Association for Computational Mechanics 2025 (UKACM2025), at QMUL
- Session Chair in ICTAM2024, SM07, Multi-component, composite, hierachical materials, South Korea
- Session Chair in UKACM2024, Durham University
- Session Chairs in ICCM2023, Belfast
- Session Chair in UKACM2022, University of Nottingham

Outreach Activities

Advanced Materials Show at National Exhibition Centre in Birmingham May 2024

- We participated in a prominent trade fair at the NEC in Birmingham, where we showcased our latest advancements in materials science through an interactive exhibit. As part of the event, we delivered a well-received presentation titled “Creating Lighter, More Durable Advanced Materials for Transport Applications,” representing QMUL. The presentation highlighted our cutting-edge research in developing innovative composite materials aimed at improving the efficiency, sustainability, and safety of transport systems. We explored key breakthroughs in lightweight, high-strength materials designed to reduce energy consumption and enhance durability in aerospace, automotive, and rail industries. Our participation not only underscored QMUL’s leadership in materials science but also facilitated meaningful discussions with industry leaders, fostering potential collaborations and real-world applications of our research.

Festival of Communities at QMUL June 2022 and June 2023

- We had all-day showcase activities on the stand with the topic "Lightweight materials for sustainable transportation". We have shown the potential of natural fibres in our future vehicles/wind turbines to make them more sustainable and recyclable. The youngsters also enjoyed building their own architected structures using the 3D printing pens.
- During the day, we also organised a 45-mins workshop (led by Dr Siamak Khosroshahi). About 15-16 kids joined the competition "Make your crash helmets for eggs challenge". It was an exciting and engaging hands-on activity! In the end, the winner used about 30g of sponge, bubble wrap and paper straws to protect an egg (70g) from 2m height drop. The winner was a 6 year-old girl.

New Scientist Live at Excel Exhibition Centre October 2024

- As part of the "Discovery Materials" outreach activities of **Henry Royce Institute**. We participated in the New Scientist Live event with a stand, where we highlighted our role in materials research and material characterisation. At our stand, we showcased innovative shape-morphing materials, such as liquid crystal elastomers that behave like sunflowers, changing direction in response to sunlight. We hope to educate and inspire the young generation about Materials Science.

PUBLICATIONS (12 1ST AND 18 CORRESPONDING AUTHOR*, 2800 CITATIONS, H-INDEX 23)

(1) Sustainable Multifunctional Composites & Advanced Manufacturing

1. Q. Zhou, **W. Tan**, E. Bilotti*, et al., Hierarchical materials from fused silk (Under revision, A very novel paper on the bio–sourced, recyclable, and biodegradable silk composites. We report a simple and rapid thermo–mechanical process to fuse silk fibres into high perfomance and multifunctional solid materials. We have filed a Patent and submitted it to **Nature**)
2. R. Mao, S. Feng, Z. Lei, R. Bai, **W. Tan***, Mechano-electrochemical analysis of lithiation-induced deformation of composite electrodes using carbon fibre as current collector, Composites Science and Technology (2025) 111251. doi:10.1016/j.compscitech.2025.111251
3. H. Kansara, M. Liu*, Y. He, **W. Tan***, Inverse design and additive manufacturing of shape-morphing structures based on functionally graded composites, Journal of the Mechanics and Physics of Solids (2023) 105382
   (**Q1, IF: 5.3, citations: 17, Top journal in Solid Mechanics**, Traditionally, the development of shape–morphing Kirigami structures relied on inefficient trial–and–error forward approaches, often leading to excessive material use and energy–intensive prototyping. To overcome this challenge, we introduced a new **inverse design** framework that leverages nonlinear beam equations and functionally graded composites. This approach not only enables precise control over bending behaviour and shape–changing performance but also minimises waste, reduces the need for repeated manufacturing cycles, and promotes more sustainable pathways in morphing material design. doi:10.1016/j.jmps.2023.105382
4. H. Sun, D. Xiang, T. Qiu, L. Liu, M. Wang*, C. Zhao, B. Wang, H. Li, Y. Wu, **W. Tan***, Damage self-sensing behavior of basalt fiber/polymer composites modified via electrophoretic deposition, Available at SSRN 5457441.
   URL https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5457441
5. **W. Tan**, J. C. Stallard, C. Jo, M. F. De Volder, N. A. Fleck*, The mechanical and electrochemical properties of polyaniline-coated carbon nanotube mat, Journal of Energy Storage 41 (2021) 102757 (Q1, IF: 9.4, citations: 9). doi:10.1016/j.est.2021.102757
6. **W. Tan**, J. C. Stallard, F. R. Smail, A. M. Boies, N. A. Fleck*, The mechanical and electrical properties of direct-spun carbon nanotube mat-epoxy composites, Carbon 150 (2019) 489–504 (Q1, IF: 10.9, citations: 41). doi:10.1016/j.carbon.2019.04.118
7. **W. Tan***, F. Naya, L. Yang, T. Chang, B. Falzon*, L. Zhan*, J. Molina-Aldareguía, C. González, J. Llorca*, The role of interfacial properties on the intralaminar and interlaminar damage behaviour of unidirectional composite laminates: Experimental characterization and multiscale modelling, Composites Part B: Engineering 138 (2018) 206–221 (**Q1, IF: 13.1, citations: 126**.) doi:10.1016/j.compositesb.2017.11.043
8. R. Wang, B. Niu, **W. Tan***, A novel multistable honeycomb structure with tailored variable-length functions, Engineering Structures (2025) 119354 (Q1, IF: 5.6)
   doi:10.1016/j.engstruct.2024.119354
9. E. Koliolios, D. G. Mills, J. J. Busfield, **W. Tan***, The nail penetration behaviour of carbon nanotube composite electrodes for energy storage, Frontiers in Materials (2021) 429 (Q2, IF: 3.2) doi:10.3389/fmats.2021.741541
10. J.-J. Mao*, S. Wang, **W. Tan***, M. Liu*, Modular multistable metamaterials with reprogrammable mechanical properties, Engineering Structures 272 (2022) 114976 (Q1, IF: 5.5, citations: 15).
    doi:10.1016/j.engstruct.2022.114976
11. X. Zhang, **W. Tan**, T. Carey, B. Wen, D. He, A. Arbab, A. Groombridge, F. Smail, J. de La Verpilliere, C. Yao, et al., Enhanced composite thermal conductivity by percolated networks of

in-situ confined-grown carbon nanotubes, Nano Research (2023) 1–9 (Q1, IF: 8.9) doi:10.1007/s12274-023-6209-6

12. D. Xiang, T. Shui, H. Qiao, **W. Tan**, E. Harkin-Jones, J. Zhang, P. Ji, P. Wang, B. Wang, C. Zhao, et al., Enhanced interfacial interaction, mechanical properties and thermal stability of basalt fiber/epoxy composites with multi-scale reinforcements, Composite Interfaces (2023) 1–23 (Q2, IF: 2.6, citations: 3) doi:10.1080/09276440.2023.2220500
13. H. Sun, D. Xiang, J. Zhang, **W. Tan**, E. Harkin-Jones, J. Wang, M. Wang, B. Wang, C. Zhao, H. Li, et al., Electrical, mechanical and damage self-sensing properties of basalt fiber reinforced polymer composites modified by electrophoretic deposition, Progress in Natural Science: Materials International (2023) 593–600 (Q1, IF: 4.7) doi:10.1016/j.pnsc.2023.11.003
14. X. Wang, P. Li, D. Xiang, B. Wang, Z. Zhang, J. Zhang, C. Zhao, H. Li, **W. Tan**, J. Wang, et al., Influence of high-temperature, high-pressure, and acidic conditions on the structure and properties of high-performance organic fibers, Materials Testing 64 (5) (2022) 623–635 (Q2, IF: 1.59, citations: 1) . doi:10.1515/mt-2021-2099
15. J. Ge, **W. Tan**, S. Ahmad, B. G. Falzon, G. Catalanotti, C. Higgins, Y. Jin, D. Sun, Temperature-dependent cutting physics in orthogonal cutting of carbon fibre reinforced thermoplastic (cfrtp) composite, Composites Part A: Applied Science and Manufacturing 176 (2024) 107820 (Q1, IF: 8.7). doi:10.1016/j.compositesa.2023.107820
16. T. Gspann, A. Kaniyoor, **W. Tan**, P. Kloza, J. Bulmer, J. Mizen, G. Divitini, J. Terrones, D. Tune, J. Cook, et al., Catalyst-mediated enhancement of carbon nanotube textiles by laser irradiation: Nanoparticle sweating and bundle alignmen, Catalyst 2021 (11) (2021) 368. doi:10.3390/catal11030368
17. X. Zhang, **W. Tan**, F. Smail, M. De Volder, N. Fleck, A. Boies, High-fidelity characterization on anisotropic thermal conductivity of carbon nanotube sheets and on their effects of thermal enhancement of nanocomposites, Nanotechnology 29 (36) (2018) 365708 (Q1, IF: 3.9, citations: 14). doi:10.1088/1361-6528/aacd7b
18. J. Stallard, **W. Tan**, F. Smail, T. Gspann, A. Boies, N. Fleck, The mechanical and electrical properties of direct-spun carbon nanotube mats, Extreme Mechanics Letters 21 (2018) 65–75 (Q1, IF: 4.7, citations: 74). doi:10.1016/j.eml.2018.03.003
19. H. Liu, B. Falzon, G. Catalanotti, **W, Tan**, An experimental method to determine the intralaminar fracture toughness of high-strength carbon-fibre reinforced composite aerostructures, The Aeronautical Journal (2018) 1–19 (Q1, IF: 1.3, citations: 32)
20. T. Chang, L. Zhan, **W. Tan**, S. Li, Effect of autoclave pressure on interfacial properties at micro-and macro-level in polymer-matrix composite laminates, Fibers and Polymers 18 (8) (2017) 1614–1622. doi:10.1007/s12221-017-7384-4
21. H. Liu, B. G. Falzon, **W. Tan**, Experimental and numerical studies on the impact response of damage-tolerant hybrid unidirectional/woven carbon-fibre reinforced composite laminates, Composites Part B: Engineering 136 (2018) 101–118 (Q1, IF: 13.2, citations: 215). doi:10.1016/j.compositesb.2017.10.016

(2) Computational Mechanics of Composite Materials

22. **W. Tan**, E. Martínez-Pañeda*, Phase field predictions of microscopic fracture and r-curve behaviour of fibre-reinforced composites, Composites Science and Technology (2021) 108539 (**Q1, IF: 9.1, citations: 100**, Understanding microstructural effects on composite fractures is challenging due to the high computational cost. This study presents a **novel multiscale phase field fracture** model to predict microscale crack behaviour and explores the effect of porosity on the fracture toughness. The findings offer insights for designing damage–tolerant materials efficiently). doi:10.1016/j.compscitech.2020.108539

23. Y. Liu, **W. Tan***, B. Xia, Z. Li, H. Ren, J. Du*, A generalized governing equation for structural optimization, Available at SSRN 5206633 (**Physics–based structural optimisation, CMAME, under review**, a very novel contribution to unify different structural optimisation methods).
URL https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5206633

24. L. Webb, C. Kadapa, **W. Tan***, A numerical framework for high-velocity liquid-solid impact: Multiphase flow and fluid-structure interactions, Available at SSRN 5092850 (**Liquid–solid impact modelling**, a novel contribution to model the liquid–solid impact behaviour).
URL https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5092850

25. K. Au-Yeung, A. Quintanas-Corominas, E. Martínez-Pañeda, **W. Tan***, Hygroscopic phase field fracture modelling of composite materials, Engineering with Computers (2023) 1–18 (**Q1, IF: 8.7, citations: 7**, This paper presents a new **multi–physics phase field modelling** to capture the influence of **moisture and temperature** on composite materials). doi:10.1007/s00366-023-01820-z

26. Z.-Q. Cheng, H. Liu, **W. Tan***, Advanced computational modelling of composite materials, Engineering Fracture Mechanics (2024) 110120 (Q1, IF: 4.7)
doi:10.1016/j.engfracmech.2024.110120

27. Z.-Q. Cheng, J.-J. Xiong, **W. Tan***, Fatigue crack growth and life prediction of 7075-t62 aluminium-alloy thin-sheets with low-velocity impact damage under block spectrum loading, International Journal of Fatigue (2021) 106618 (Q1, IF: 6.0, citations: 13)
doi:10.1016/j.ijfatigue.2021.106618

28. **W. Tan***, B. Liu, A physically-based constitutive model for the shear-dominated response and strain rate effect of carbon fibre reinforced composites, Composites Part B: Engineering (2020) 108032 (**Q1, IF: 13.1, citations: 11**. Inspired by crystal plasticity, we develop a **micro–mechanical** model capturing matrix shearing, fibre rotation, and **strain rate effects**, validated against diverse loading scenarios). doi:10.1016/j.compositesb.2020.108032

29. **W. Tan***, B. G. Falzon, A crystal plasticity phenomenological model to capture the non-linear shear response of carbon fibre reinforced composites, International Journal of Lightweight Materials and Manufacture 4 (1) (2020) 99–109 (Q1, IF: 2.2, citations: 8). doi:10.1016/j.ijlmm.2020.06.004

30. R. Jiang, L. Yang, H. Liu, **W. Tan***, X. Sun, H. Cheng, W. Mao, A multiscale methodology quantifying the sintering temperature-dependent mechanical properties of oxide matrix composites, Journal of the American Ceramic Society 101 (7) (2018) 3168–3180 (Q1, IF: 3.9, citations: 16). doi:10.1111/jace.15473

31. **W. Tan**, B. G. Falzon*, Modelling the crush behaviour of thermoplastic composites, Composites Science and Technology 134 (2016) 57–71 (**Q1, IF: 9.1, citations: 122)**. doi:10.1016/j.compscitech.2016.07.015

32. **W. Tan**, B. G. Falzon*, Modelling the nonlinear behaviour and fracture process of as4/pekk thermoplastic composite under shear loading, Composites Science and Technology 126 (2016) 60–77 (**Q1, IF: 9.1, citations: 103)**. doi:10.1016/j.compscitech.2016.02.008

33. **W. Tan**, B. G. Falzon, M. Price, H. Liu, The role of material characterisation in the crush modelling of thermoplastic composite structures, Composite Structures 153 (2016) 914–927 (Q1, IF: 6.3, citations: 44). doi:10.1016/j.compstruct.2016.07.011

34. **W. Tan**, B. G. Falzon, M. Price, Predicting the crushing behaviour of composite material using high-fidelity finite element modelling, International journal of crashworthiness 20 (1) (2015) 60–77 (Q2, IF:1.47, citations: 53). doi:10.1080/13588265.2014.972122

35. **W. Tan**, B. G. Falzon*, L. N. Chiu, M. Price, Predicting low velocity impact damage and compression-after-impact (cai) behaviour of composite laminates, Composites Part A: Applied Science and Manufacturing 71 (2015) 212–226
(**Q1, IF: 8.7, citations: 526**. Modelling the dynamic impact damage tolerance and residual compression–after–impact strength of composites was highly challenging due to the inherent heterogeneity. This study presented a **continuum damage mechanics** model by integrating the underlying physics of fibre breakage, matrix cracking, and delamination. The model and associated open–source code have been used by many researchers and industrial partners). doi:10.1016/j.compositesa.2015.01.025

36. Z.-Q. Cheng, J. Xia, H. Liu, Z.-W. Zhu, **W. Tan**, Compressive failure mechanisms of fibre metal laminates with 2/1 and 3/2 configurations after low-velocity impact, Thin-Walled Structures 211 (2025) 113112 . doi:10.1016/j.tws.2025.113112

37. B. S. Aragh, **W. Tan**, E. B. Farahani, M. Al-Greer, D. Hughes, Porosity-dependent stability analysis of bio-inspired cellular nanocomposite shells, International Journal of Mechanical Sciences 263 (2024) 108763 (Q1, IF: 7.3). doi:10.1016/j.ijmecsci.2023.108763

38. T. Chang, L. Zhan, **W. Tan***, S. Li, Optimization of curing process for polymer-matrix composites based on orthogonal experimental method, Fibers and Polymers 18 (1) (2017) 148–154. doi:10.1007/s12221-017-6606-0

39. T. Chang, L. Zhan, **W. Tan**, S. Li, Void content and interfacial properties of composite laminates under different autoclave cure pressure, Composite Interfaces 24 (5) (2017) 529–540. doi:10.1080/09276440.2016.1237113

40. Z.-Q. Cheng, **W. Tan**, J.-J. Xiong, E.-M. He, T.-H. Xiong, Y.-P. Wang, Modelling fatigue behaviours and lifetimes of novel glare laminates under random loading spectrum, Composite Structures 311 (2023) 116799 (Q1, IF: 6.3, citations: 3). doi:10.1016/j.compstruct.2023.116799

41. Z.-Q. Cheng, **W. Tan**, J.-J. Xiong, Modelling pre-fatigue, low-velocity impact and post-impact fatigue behaviours of composite helicopter tail structures under multipoint coordinated loading spectrum, Thin-Walled Structures 176 (2022) 109349 (Q1, IF: 6.4, citations: 4). doi:10.1016/j.tws.2022.109349

42. H. Liu, B. G. Falzon, S. Li, **W. Tan**, J. Liu, H. Chai, B. R. Blackman, J. P. Dear, Compressive failure of woven fabric reinforced thermoplastic composites with an open-hole: an experimental and numerical study, Composite Structures 213 (2019) 108–117 (Q1, IF: 6.3, citations: 40) . doi:10.1016/j.compstruct.2019.01.070

43. X. Li, D. Ma, H. Liu, **W. Tan**, X. Gong, C. Zhang, Y. Li, Assessment of failure criteria and damage evolution methods for composite laminates under low-velocity impact, Composite structures 207 (2019) 727–739 (Q1, IF: 6.3, citations: 138). doi:10.1016/j.compstruct.2018.09.093

44. H. Liu, B. G. Falzon, **W. Tan**, Predicting the compression-after-impact (cai) strength of damage-tolerant hybrid unidirectional/woven carbon-fibre reinforced composite laminates, Composites Part A: Applied Science and Manufacturing 105 (2018) 189–202 (Q1, IF: 8.7, citations: 91). doi:10.1016/j.compositesa.2017.11.021
45. B. Falzon, **W. Tan**, Predicting impact damage, residual strength and crashworthiness of composite structures, SAE International Journal of Materials and Manufacturing 9 (3) (2016) 718–728 (Q4, IF: 0.8, citations: 14). doi:10.4271/2016-01-0497

(3) Data-driven Design and Optimisation of Composite Materials

46. H. Kansara, S. F. Khosroshahi, L. Guo, M. A. Bessa, **W. Tan***, Multi-objective bayesian optimisation of spinodoid cellular structures for crush energy absorption, Computer Methods in Applied Mechanics and Engineering 440 (2025) 117890, (**Q1, IF: 6.9, NO.1 journal in Computational Mechanics**, a very novel contribution to use AI to optimise the architected materials considering the plasticity, **Github code**). doi:10.1016/j.cma.2025.117890
47. J. Fu, **W. Tan***, Stochastic reconstruction of multiphase composite microstructures using statistics-encoded neural network for poro/micro-mechanical modelling, Computer Methods in Applied Mechanics and Engineering 441 (2025) **(Q1, IF: 6.9, NO.1 journal in Computational Mechanics**, a new **AI** framework for stochastic reconstruction of composites. A high–fidelity tool to reconstruct multiphase microstructures for image–based poro/micro–mechanical analysis.). doi:10.1016/j.cma.2025.117986
48. J. Fu*, **W. Tan***, D. Xiao*, X. Zhuang*, Computational intelligence in stochastic reconstruction of porous microstructures for image-based poro/micro-mechanical modeling, Archives of Computational Methods in Engineering (2025) 1–69. doi:10.1007/s11831-025-10313-9

Book Chapter and Patent:

1. B. G. Falzon, **W. Tan**, Virtual testing of composite structures: progress and challenges in predicting damage, residual strength and crashworthiness, in: The structural integrity of carbon fiber composites, Springer, Cham, 2017, pp. 699–743
2. J. Tan, **W. Tan**, Y. Liu, Z. Tan, A new extracorporeal magnetic driving system for an axial flow blood pump, cN Patent CN 102500002 B (Oct. 27 2011)

Conference presentations and proceedings:

1. **W. Tan***, **Albert Cardon Plenary Lecture: Bridging Mechanics and Machine Learning in Composite Design and Optimisation**, in: European Conference on Composite Materials (ECCM21), Nantes, France (1100+ international audience), 2024
2. **W. Tan***, H. Kansara, J. Fu, M. Besaa, Data-driven optimisation of energy-absorbing cellular composites, in: 26th International Congress of Theoretical and Applied Mechanics (ICTAM 2024), Daegu, South Korea, 2024
3. **W. Tan***, Modelling moisture-assisted fracture and liquid-solid impact in composite materials using phase field method, in: 9th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS2024), Lisbon, Portugal, 2024
4. **W. Tan**, Phase field modelling of the hygroscopic failure behaviours of composite materials: the role of moisture, in: ICCM23, Belfast, 2023
5. **W. Tan**, Phase field modelling the hygroscopic failure behaviours of composite materials, in: UKACM2023, University of Warwick, 2023
6. W. Wang, **W. Tan***, Mechanical performance of carbon nanotube film under high-speed impact loading, in: ICCM23, Belfast, 2023

7. S. Khosroshahi, **W. Tan***, Data-driven topology optimisation of energy absorbers, in: ICCM23, Belfast, 2023
8. **W. Tan***, H. Kansara, M. Liu, Y. He, Inverse design of shape-morphing structures based on functionally graded elastomer composites, in: Rubber Conference 2023, University of Edinburgh, 2023
9. A. Restasari, A. Kaur, K. Akutagawa, J. J. C. Busfield, **W. Tan***, Evaluation of mechanical and self-healing properties of poly(urethane-urea) compounds for wind turbine coating application, in: Rubber Conference 2023, University of Edinburgh, 2023
10. S. Khosroshahi, H. Kansara, M. Bessa, **W. Tan***, Data-driven framework for topology optimisation of energy absorbers, in: European Solid Mechanics Conference 2022, Galway, Ireland, 2022
11. **W. Tan***, Multiscale modelling the fracture behaviour of composite materials, in: UK Association for Computational Mechanics 2022 (UKACM2022), Nottingham, 2022
12. H. Kansara, M. Liu, Y. He, S. Kumar, **W. Tan***, Inverse design of functionally graded composites for morphing structures, in: 18th European Mechanics of Materials Conference (EMMC18), Oxford, 2022
13. **W. Tan**, J. Stallard, C. Jo, M. D. Volder, N. Fleck, The mechanical and electrochemical properties of structural power composites, in: 25th International Congress of Theoretical and Applied Mechanics , 2021
14. E. G. Ulloa, J. Busfield, N. Pugno, **W. Tan***, Thermo-mechanical modelling on lithium ion battery cells, in: UK Association of Computational Mechanics (UKACM) 2021 conference, 2021
15. **W. Tan**, Towards structural solid-state pseudocapacitors: the electrochemical and mechanical behaviour of carbon nanotube-polyaniline composites, in: ICCS23 & MECHCOMP6, Porto, 2020
16. **W. Tan**, The mechanical and energy-storage properties of carbon nanotube-polymer composites, in: International Workshop on Graphene and Carbon Nanotubes in Experimental Mechanics, Manchester, 2019 (Invited speaker)
17. **W. Tan**, H. Tankasala, N. A. Fleck, The stiffness and strength of epoxy-infilled carbon-nanotube mats, in: 10th European Solid Mechanics Conference, Bologna, Italy, 2018
18. B. Falzon, **W. Tan**, Predicting impact damage, residual strength and crashworthiness of composite structures, SAE International Journal of Materials and Manufacturing 9 (3) (2016) 718–728 (Q4, IF: 0.8, citations: 14). doi:10.4271/2016-01-0497
19. **W. Tan**, B. G. Falzon, L. N. Chiu, M. Price, Numerical prediction of the low-velocity impact damage and compression after impact strength of composite laminates, in: IOP Conference Series: Materials Science and Engineering, Vol. 74, IOP Publishing, 2015, p. 012015

SUPERVISION

Primary supervisor (4 PDRAs, 7 PhD students) Jan. 2020 – Present

- **Postdoc researcher**: Dr. Devender Kumar, 2024-present, QMUL, Project: Experimental Mechanics of Resilient Materials for mitigating Liquid-solid Impact.
- **Postdoc researcher**: Dr. Yang Liu, 2024-present, QMUL, Project: Computational Modelling of Resilient Materials for mitigating Liquid-solid Impact.
- **Postdoc researcher**: Dr. Hongye Guo, 2024-present, QMUL, Project: Manufacturing New Resilient Materials for mitigating Liquid-solid Impact.

- **Postdoc researcher**: Dr. Jinlong Fu, 2023-present, QMUL, Project: Data-driven Mechanistic Modelling of Scalable Cellular Composites for Crash Energy Absorption.
- **Postdoc researcher**: Dr. Siamak Khosroshahi, 2022-2023, QMUL, Project: Data-driven Mechanistic Modelling of Scalable Cellular Composites for Crash Energy Absorption.
- **PhD student**: Yu Yuan, 2020-2024, QMUL, Project: The Finite Integration Method Algorithm and its Applications in Solid Mechanics. (Pass Viva with minor correction)
- **PhD student**: Emilio Felipe Gomez, 2020-present, QMUL, Project: Developing crashworthy and thermally conductive graphene related composite materials for electrical car battery assembly.
- **PhD student**: Hirak Kansara, 2021-present, QMUL, Project: Developing novel cellular composites for Crash Energy Absorption using Data-driven methods.
- **PhD student**: Wenqi Wang, 2021-present, QMUL, Project: Scalable cellular composites for crashing energy absorption.
- **PhD student**: Jie Yang, 2022-present, QMUL, Project: Multiphysics Modelling and Experimental Investigation for Developing Resilient Electrodes.
- **PhD student**: Afni Restasari, 2022-present, QMUL, Project: Developing self-healing elastomer coatings for wind turbine blades.
- **PhD student**: Luke Webb, 2024-present, QMUL, Project: Modelling liquid-solid impact behaviour of materials
- **PhD student**: Haoming Sun Webb, 2025-present, QMUL, Project: Development of sustainable composite materials with self-sensing and self-repairing functions
- Visiting PhD student: Rui Mao, 2024-present, QMUL, project: Structural battery composites.
- Visiting PhD student: Samina Ishaq, 2024-present, QMUL, project: Hybrid composite materials.
- Visiting PhD student: Zhengqiang Cheng, 2021-2022, QMUL, project: Low-velocity impact damage tolerance of carbon fibre composites.(Now Assistant professor in Southwest Jiaotong University)
- MSc student: Marco Antonio Gallegos Gardea, 2024-present, QMUL, Project: Testing and modelling of porous materials and composites
- MSc student: Luke J. Webb, 2023-present, QMUL, project: Modelling the liquid-solid impact damage of materials.
- MSc student: Syju Pappy Alexander, 2022-2023, Lightweight composite materials for hydrogen storage tank
- MSc student: Kang Xu, 2022-2023, Smooth Particles Hydrodynamics for liquid-solid impact modelling
- MSc student: Kit Au-Yeung, 2021-2022, QMUL, project: Phase-Field Fracture Modelling of Anisotropic Composite Laminates. (Now working in Subsea7 as a research engineer)
- MEng students: Gary Koh, Merrin Rose Varghese, Hirak Kansara, John Luk, 2020-2021, QMUL, Project: 3D Printed Cellular Composites for Impact Mitigation or Crash Energy Absorption.
- MEng students: Abdulaziz Nasiruddin, Evangelos Koliolios, Daniel Mills, Wei-kong Mao, 2020-2021, QMUL, Project: The crashworthiness of carbon nanotube composite electrodes for energy-storage applications.

Co-supervisor Jan. 2021 – Present

- PhD student: Qichen Zhou, 2021-Present, QMUL, Project:silk-based fibre-reinforced composites. (Primary supervisor: Dr. Emiliano Bilotti)

Plenary and Invited talks

- Delivered a **plenary** lecture "Bridging mechanics and machine learning in the composite design and optimisation", on invitation from Prof. Christophe Binetruy, July 2024, ECCM21, Nantes. (Albert Cardon Plenary Lecture, ESCM Young Researcher Award 1200 attendees)

- Delivered an **invited** seminar "Bridging mechanics and machine learning in the design and optimisation of materials", on invitation from Dr. Tim Hagmen, March 2025, University of Oxford.
- Delivered an **invited** seminar "Inverse design of architected materials from mechanics-based method to data-driven methods", on invitation from Prof. Burigede Liu, Dec 2024, University of Southampton.
- Delivered an **invited** seminar "Bridging mechanics and machine learning in the design and optimisation of lightweight materials", on invitation from Prof. Susmita Naskar, October 2024, University of Southampton.
- Delivered an **invited** lecture "Inverse Design and Additive Manufacturing of Functionally-Graded Composites", on invitation from Dr. Mingchao Liu, August 2024, ICCES30, Singapore.
- Delivered an **invited** "Bridging mechanics and machine learning in composite design and optimisation", on invitation from Prof. Stefan Szyniszewski, March 2024, Durham University.
- Delivered an **invited** webinar "Mechanics of composite materials: from load-bearing to shape-morphing", SASCOM Seminar Series, on invitation from Prof. Gilles Lubineau, Nov 2022, Saudi Arabia.
- Delivered an **invited** webinar "Multiscale modelling of composite materials", Campus Arts et Métiers de Metz, on invitation from Dr. Francis Praud, May 2022, France.
- Deliver an **invited** talk "The mechanical and energy-storage properties of carbon nanotube-polymer composites", at University of Manchester, on invitation from Dr. Daniel Mulvihill, June 2019, UK
- Delivered an **invited** lecture "Mechanics of composite materials: From load bearing to shape morphing", Materials Engineering and Mechanics Seminars, Imperial College London, on invitation from Dr. Emilio Martínez-Pañeda, April 2022, UK.
- Deliver an **invited** talk "Progress in composite damage modelling", at Wuhan University, on invitation from Prof. Sheng Liu, May 2019, China
- Deliver an **invited** talk "Mechanics of composite materials: From load bearing to energy storage", at Southern University of Science and Technology, on invitation from Prof. Yijun Liu, May 2019, China
- Deliver an **invited** talk "Multiscale modelling of composites materials", at Central South University, on invitation from Prof. Kui Wang, April 2018, China
- Deliver an **invited** talk "Crushing modelling of composites structures", at Hunan University, on invitation from Prof. Guangyong Sun, April 2018, China
- Delivered an **invited** "Properties of Carbon nanotube and their composites", Micromechanics seminar, University of Cambridge, on invitation from Prof. Norman Fleck, October 2017, UK.
- Delivered an **invited** "Advanced Damage modelling of composite aerostructures", Huazhong University of Science and Technology, on invitation from Prof. Renfu Li, December 2016, China.
- Delivered an **invited** "Advanced computational modelling of composite aerostructures", Northwestern Polytechnical University, on invitation from Prof. Yongjie Zhang, December 2016, China.
- Delivered an **invited** "Modelling the behaviour of thermoplastic composite under crushing loading", IMDEA material institute, on invitation from Dr. Claudio Lopes, April 2016, Spain.
- Delivered an **invited** "Virtual testing of composite aerostructures", Beihang University, on invitation from Prof. Zixing Lu, January 2015, China.
- Delivered an **invited** "Damage modelling of composite aerostructures", Shanghai Jiaotong University, on invitation from Prof. Hai Wang, January 2015, China.
- Delivered an **invited** webinar "Multiscale modelling of composite materials: from load-bearing to shape-morphing", Dalian University of Technology, on invitation from Prof. Bin Niu, May 2022, China.