

RICHARD (YU) JIANG, BSc, MIET

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EDUCATION

University of Cambridge, Christ's College

Cambridge, UK

PhD Candidate in Manufacturing Engineering, Institute for Manufacturing (IfM)

Oct 2020 – Present

- Cambridge Trust Scholar; Winner of the IET International Travel Award, 2024; Cambridge Philosophical Society Research Studentship; Great Britain-China Educational Trust Chinese Student Award
- Finalist in Student Presentation Competition at International Conference on Advanced Manufacturing 2023
- First Class in Progress Examination of Engineering PhD; 1st Prize in Best Poster Competition, IfM PhD Conference 2021
- ASTM International Emerging Professional (ASTM EP) Award; Christ's College Old Member's Sporting Award

Shanghai Jiao Tong University

Shanghai, China

BSc in Engineering, Department of Civil Engineering (First Class Equivalent)

Sep 2015 – June 2019

- Chinese National Scholarship, Ministry of Education (Rank: 1/46)
- 2nd Prize in Excellent Innovation Achievement of Civil Engineering Undergraduates in National Universities
- Excellent Graduates Award, Shanghai Municipal Education Commission (two individuals awarded per year)

PROFESSIONAL EXPERIENCES

University of Cambridge

Cambridge, UK

PhD Researcher, Supervised by Prof Ronan Daly & Prof Abir Al-Tabbaa

Oct 2020 – Present

- Instituted a new research capability of extrusion-based 3D printing of cementitious materials across the groups
- Experimentally investigated and numerically modelled the time-dependent rheological properties of cementitious materials which exhibit viscoelasticity and thixotropy and quantified the ageing effect on the morphology of printed filaments
- Defined a filament-level quality control parameter, Print Quality Assurance Time (PQAT), which allows for greater consistency in properties of 3D-printed cementitious structures and potentially any materials with transient rheology (Paper submitted)
- Found that after the PQAT, interlayer load-bearing capacity of 3D-printed structures significantly decreases by perform four-point bending and direct tensile test and that the interlayer bonding strength remains unchanged (Paper in the pipeline)

Layer Construction, Inc.

Cambridge, UK; Seattle, US

Founder & President, 3D Printing in Construction and Real Estate

June 2022 – Sep 2023

- Founded the 1st turnkey 3D construction platform combining AI-powered software with Next-Gen 3D printing hardware for home construction, which aims to alleviate the current ~5mn US housing shortage by ~20% (in estimate)
- Formulated the company's vision and strategy, mobile 3D printer product design, R&D and launching, roadshow and investor communication, funding, budgeting and resource management
- Negotiated partnerships with world-leading construction material, robotics conglomerates and builders, to achieve grant, joint R&D, testing and evaluation, as well as workspace, facilities and technical assistance
- Featured as top of the list in BuiltWorlds' Startup Profile Database; finalist of Top Global 50 of Elevator Pitch Competition (EPiC)
- Awarded Silver Prize in China International Innovation and Entrepreneurship Competition by providing an efficient, customised, and greener housing solution using Intelligent Additive Manufacturing

Shanghai Jiao Tong University

Shanghai, China

Research Assistant, Supervised by Prof Bing Chen

Jan 2018 – Sep 2020

- Conceptualised the hydration effects of steel slag powder in magnesium phosphate cement which initiated multiple subsequent studies in this field
- Proposed the composition of secondary hydration products containing both crystal and amorphous phases
- Concluded that the addition of steel slag powder strengthened late-stage compressive strength and water resistance of magnesium phosphate cement apart from cost reduction and waste reutilisation
- Found improvements in compressive strength of fly ash on basalt fiber-reinforced magnesium phosphate cement resulted from the formation of new reaction products as evidenced by XRD, TGA and SEM-EDS analyses

PUBLICATIONS & CONFERENCES

- Yu Jiang, Qingxin Zhang, Abir Al-Tabbaa, Ronan Daly. The critical role of material ageing in controlling macroporosity in 3D printed cementitious structures. *Nature Communicates*. (Under Review) Impact factor
16.6

- Effects of time-dependent rheological properties of cementitious materials on the print quality of extrusion-based 3D printing. **4th RILEM International Conference on Concrete and Digital Fabrication**. 4 – 6 September 2024, Munich, Germany. (Abstract Accepted)
- Effects of time-dependent rheological properties of cementitious materials on the print quality of extrusion-based 3D printing. **2024 RILEM Week and SMS Conference 2024**. 25 - 30 August 2024, Toulouse, France. (Abstract Accepted)
- Opportunities and Challenges of 3D-Printed Structures and Infrastructure. **Cementitious Materials International Congress 2024**. 18 – 19 April 2024, Casablanca, Morocco (Unsolicited Invited Speaker)
- A Time-Dependent Rheology-Based Analysis to Understand Filament Morphology in Extrusion-Based 3D Printing of Cementitious Materials. **ASTM International Conference on Advanced Manufacturing 2023**. 1 Nov 2023, Washington DC, USA (Oral Presentation)
- Meng X., **Jiang, Y.**, Chen B., & Wang L. Research progress on the setting time and solidification mechanism of magnesium phosphate cement: A review. **Construction and Building Materials**, 408, 133612. 7.4
- Xiao Y., **Jiang Y.**, Chen B.* & Wang L. Properties of red mud blended magnesium phosphate cements: workability and microstructure evolution. **Construction and Building Materials**, 409 134023. 7.4
- Jing, Y., **Jiang, Y.**, Chen B.*, & Wang L. (2023). Influence of steel slag powder on the characteristics of magnesium phosphate cement. **Journal of Building Engineering**, 77, 107454. 6.4
- A Time-Dependent Rheology-Based Analysis to Understand Filament Morphology in Extrusion-Based 3D Printing of Cementitious Materials. **IOP PGS Printing for the Future**. 1 June 2023, Institute of Physics, London, UK (Oral Presentation)
- Infrastructure 3D Printing Facilitates Smart Cities. **IfM PhD Conference**. 2021, Cambridge, UK. (Oral Presentation, Best Poster)
- Ahmad, M. R., Chen, B.*, & **Jiang Y.** (2019). A comprehensive study of basalt fiber reinforced magnesium phosphate cement incorporating ultrafine fly ash. **Composites Part B: Engineering**, 168, 204-217. 13.1
- **Jiang, Y.**, Ahmad, M. R., & Chen, B.* (2019). Properties of magnesium phosphate cement containing steel slag powder. **Construction and building materials**, 195, 140-147. 7.4

SERVICES

Professional Organization Committee Member

- UK National Expert at British Standards Institution (**BSI**) UK National Committee AMT/8 for Additive Manufacturing and to be delegated to the 23rd plenary meeting of ISO/TC 261 “Additive Manufacturing” (April 2024)
- International Organization for Standardization (**ISO**) Committee TC 261 for Additive Manufacturing (Aug 2021-Jan 2022, Nov 2023-Present)
- Member of the Institute of Engineering and Technology (**MIET**)
- American Society for Testing and Material (**ASTM**) Committee F42 for Additive Manufacturing Technologies
- American Society for Testing and Material (**ASTM**) Committee C01 for Cement
- American Society for Testing and Material (**ASTM**) Committee D30 for Composite Materials
- Associate member of American Concrete Institute (**ACI**) Committee 564, 3-D Printing with Cementitious Materials
- Fellow of Cambridge Philosophical Society, Member of Institution of Civil Engineers (**ICE**), Chartered Institute of Building (**CIOB**) and Chartered Institution of Building Services Engineers (**CIBSE**)

Peer Reviewer for World-Class Journals & Conferences

- Construction and Building Materials (10)
- Journal of Building Engineering (2)
- Composites Part B: Engineering (2)
- Journal of Manufacturing Processes (1)
- Journal of Testing and Evaluation (1)
- Invited reviewer for 2024 International Manufacturing Science and Engineering Conference (MSEC 2024, 2)
- 8th International Conference on Advanced Manufacturing and Materials (ICAMM 2024, 2)