HO WAI (MATTHEW) CHIN

EDUCATION

University College London (UCL) 28/05/2020
PhD, Biomedical Engineering

- Thesis: Designing platforms to biophysically regulate T cell activation.
- Doctoral training programme: BBSRC London Interdisciplinary Biosciences Consortium.
- Conceptualised the PhD project to study the influence of substrate stiffness on T cell activation.
- Assembled a multidisciplinary team of supervisors to advise on mechanobiology, biomaterials, and process intensification.
- Primary supervisor: Prof. Richard Day (UCL Medicine); Secondary supervisor: Prof. Marc-Olivier Coppens (UCL Chemical Engineering); Tertiary supervisor: Prof. Eileen Gentleman (King's College London).

Imperial College London 01/11/2014
MSc & DIC, Biomedical Engineering

- MSc dissertation: Modulating human PARP-1 activity with allosteric DNA aptamers (Supervisor: Dr. Sylvain Ladame, Department of Bioengineering).

Imperial College London 01/08/2013
BEng & ACGI, Biomedical Engineering

- Final year individual project: Design of a microfluidic circuit board for the analysis of human microdialysis streams (Supervisor: Prof. Martyn Boutelle, Department of Bioengineering).
- Group project: Arrow-positioning haptic feedback system for visually impaired archers (involving the design and programming of Arduino-controlled X-Y table).

TECHNICAL SKILLS

Biomaterial fabrication: ➤Polyacrylamide hydrogels ➤Two-photon polymerisation (Nanoscribe Photonic Professional GT2), including the use of Hydrobio INX N400 (gelatin hydrogel) and acrylate-based photoresists (IP-S, IP-Dip) ➤Thermally induced phase separation-derived PLGA microspheres ➤Block copolymer micelle nanolithography ➤Microfluidic devices

Biology: ➤Mammalian cell culture (Jurkat cells, CAR T cells, cell lines including A549, Saos-2, PC-3) ➤Confocal microscopy ➤ELISAs ➤Immunofluorescence staining ➤T cell activation methods ➤Cell viability assays (e.g., alamarBlue)

CAD/Prototyping: ➤Microcontroller (Arduino Uno) ➤Masked stereolithography 3D printing (Anycubic Photon Mono X) ➤CAD tools (Rhino/Grasshopper 3D, Fusion 360)

IT/Programming: ➤Image processing/analysis ➤ MATLAB ➤Python ➤C++, ➤Computational fluid dynamics (COMSOL) ➤R ➤Artificial intelligence (TensorFlow, IBM Watson) ➤iOS/Android app development

RESEARCH EXPERIENCE

University College London 01/09/2020–present

***Postdoctoral Research Fellow**, Centre for Nature Inspired Engineering & Department of Chemical Engineering | Supervisor: Prof. Marc-Olivier Coppens*

- Initiated a new line of research and developed an approach combining algorithmic design, graph theory, and 3D microprinting to create geometrically complex 3D cell scaffolds.
- Developed a generative algorithm to create 3D models that recapitulate the spatial network organisation of lymphoid fibroblasts.
- Member of the "NexTGen" team, consisting of research groups from 8 institutions across 3 countries (UK, France and US), funded by Cancer Research UK, National Cancer Institute and The Mark Foundation for Cancer Research via the $25M Cancer Grand Challenges partnership.
- Proposed and developing 3D microprinted hydrogel scaffolds to recapitulate extracellular matrices in the tumour microenvironment, as part of the modelling work for NexTGen.
- Collaborators: Prof. Sophie Acton (UCL Laboratory for Molecular Cell Biology), Prof. Karin Straathof (UCL Cancer Institute), Dr. Barry Reid (UCL Chemical Engineering), Dr. Emmanuel Donnadieu (Institut Cochin, INSERM, France).

Cupris (London, UK) 03/08/2017–27/10/2017

Artificial Intelligence Intern

- Worked in a start-up environment, reporting directly to the CTO.
- Created a convoluted neural network (CNN) for otoscopic image recognition.
- Deployed the trained CNN to an iOS application for smartphone-enabled otoscopy with real-time diagnosis of eardrum conditions.

University College London 01/11/2014–01/08/2015

***Research Assistant**, Department of Chemistry*

- Used DNA nanotechnology methods to fabricate lipid bilayer-spanning DNA nanopores for biosensing and therapeutic applications, under the supervision of Dr. Stefan Howorka.
- Created website for the research group.
- Created cover for ACS Nano, Volume 9, Issue 2, 2015.

Imperial College London 01/07/2013–04/11/2013

***iGEM Team Member**, Centre for Synthetic Biology*

- International Genetically Engineered Machine (iGEM) Competition is the premier student competition in the field of synthetic biology.
- Project Plasticity: Employed synthetic biology to engineer *E. coli* to degrade non-recyclable, organic wastes and synthesise biodegradable polymers.
- Developed a computational model based on ordinary differential equations to identify metabolic bottlenecks of biopolymer synthesis in genetically engineered *E. coli*.

- Results from the model led to the design of an award-winning BioBrick, which enhanced biopolymer yield.

Imperial College London 02/07/2012–14/08/2012
***Undergraduate Research Assistant**, Centre for Bio-Inspired Technology*
- Involved in developing a printed circuit board for bioimpedance-based monitoring of internal bleeding in pregnant women, under the supervision of Dr. Nir Grossman.

TEACHING EXPERIENCE

University College London 01/09/2020–present
***Guest Lecturer and Lab Demonstrator**, Centre for Nature Inspired Engineering & Department of Chemical Engineering*
- MEng module: Nature Inspired Chemical Engineering (CENG0029)
- MSc module: Nature Inspired Solutions (CENG0080)

University of Greenwich 17/01/2022–31/08/2022
***Lecturer (fixed term)**, School of Engineering*
- MSc module: Biochemical Engineering (CHEE1011)
- Developed the whole syllabus from scratch (incl. exam papers and coursework), taught 2 h/week for 11 weeks, marking.
- Integrated own research to teach different application areas, e.g., biomaterials and immunotherapy.

The Bartlett School of Architecture, University College London 25/032021
Invited Guest Critic
- Provided critique and engaged in discussions for Bio-Integrated Design MArch/MSc Year 1 Final Projects (BARC0125).

HONOURS AND AWARDS

Competition:
1. 3rd in theWorld (out of 215 university teams); iGEMWorld Championship, Massachusetts Institute of Technology, USA (2013).
2. Best Manufacturing Project; iGEM World Championship, Massachusetts Institute of Technology, USA (2013).
3. 2nd Runner-Up; iGEM European Final, INSA Lyon, France (2013).
4. Best New BioBrick Part (Registry #: BBa_K1149051); iGEM European Final, INSA Lyon, France (2013).
5. Gold medal; iGEM European Final, INSA Lyon, France (2013).
6. Best Year 2 Engineering Design Project; Imperial College London - Department of Bioengineering (2012).

Conference/Workshop Awards:
1. Best Poster Presentation; UCL CNIE Workshop (2020).
2. Best Poster Presentation; UCL Soft Materials Network Workshop (2018).
3. Best Poster Presentation; UCL CNIE Workshop (2018).
4. 1st Prize, Research Poster Presentation (“Biological Engineering” category); ChemEngDayUK (2017).

PhD Studentship:

1. BBSRC studentship from the London Interdisciplinary Biosciences Consortium doctoral training partnership (2015-2019).

PERSONAL DEVELOPMENT AND COMPETENCES

1. Learn ARKit with Swift (Augmented Reality) Nanodegree, Udacity (2017).
2. Artificial Intelligence Nanodegree, Udacity (2017).
3. Advanced Quantitative Skills for Bioscience, SysMIC (2016).
4. Maths and Computational Skills for Bioscience, SysMIC (2016) | Project completed with distinction.

PUBLICATIONS

Peer-reviewed journal articles:

1. Todd, L., **Chin, M. H. W.** & Coppens, M.-O. Two conjectures on 3D Voronoi structures: a toolkit with biomedical case studies. Molecular Systems Design & Engineering 9, 912-919. http://dx.doi.org/10.1039/D4ME00036F (2024).
2. **Chin, M. H. W.**, Reid, B., Lachina, V., Acton, S. E. & Coppens, M.-O. Bioinspired 3D microprinted cell scaffolds: Integration of graph theory to recapitulate complex network wiring in lymph nodes. Biotechnology Journal 19, 2300359. https://doi.org/10.1002/biot.202300359 (2023). | Recognised as **Biotechnology Journal's "Top Viewed Article"**, which ranked within the **top 10%** of most-viewed papers published by the journal in 2023.
3. **Chin, M. H. W.**, Linke, J. & Coppens, M.-O. Nature-inspired sustainable medical materials. Current Opinion in Biomedical Engineering 28, 100499. issn: 2468-4511. https://doi.org/10.1016/j.cobme.2023.100499 (2023).
4. **Chin, M. H. W.**, Norman, M. D. A., Gentleman, E., Coppens, M.-O. & Day, R. M. A Hydrogel-Integrated Culture Device to Interrogate T Cell Activation with Physicochemical Cues. ACS Applied Materials & Interfaces 12, 47355–47367. https://doi.org/10.1021/acsami.0c16478 (2020).
5. **Chin, M. H. W.***, Gentleman, E., Coppens, M.-O. & Day, R. M. Rethinking Cancer Immunotherapy by Embracing and Engineering Complexity. Trends in Biotechnology 38. Special Issue: Therapeutic Biomanufacturing, 1054–1065. issn: 0167-7799. https://doi.org/10.1016/j.tibtech.2020.05.003 (2020). | ***Corresponding author**.
6. Kelwick, R., Kopniczky, M., Bower, I., Chi, W., **Chin, M. H. W.**, Fan, S., Pilcher, J., Strutt, J., Webb, A. J., Jensen, K., Stan, G.-B., Kitney, R. & Freemont, P. A Forward-Design Approach to Increase the Production of Poly-3-Hydroxybutyrate in Genetically Engineered *Escherichia coli*. PLOS ONE 10, 1–11. https://doi.org/10.1371/journal.pone.0117202 (2015).

Peer-reviewed conference proceeding:

1. Todd, L., **Chin, M.** & Coppens, M.-O. A Computational Pipeline to Optimize 3D Scaffolds for Cancer Immunotherapy in Computer Aided Chemical Engineering (eds Kokossis, A. C., Georgiadis, M. C. & Pistikopoulos, E.) 52 (Elsevier, 2023), 2705–2710. https://doi.org/10.1016/B978-0-443-15274-0.50430-3.

Other conference proceedings:

1. **Chin, M. H. W.**, Reid, B., Lachina, V., Acton, S. E. & Coppens, M.-O. Algorithmic Design of Lymph Node-Inspired 3D Microprinted Cell Scaffolds. 2023 AIChE Annual Meeting (2023).

2. **Chin, M. H. W.**, Gentleman, E., Coppens, M.-O. & Day, R. M. Biophysical fine-tuning of immune cell behaviour by using a biomaterial-based culture platform. European Biophysics Journal With Biophysics Letters 46, S244-S244 (2017).

Book chapter:

1. Sofokleous, P., **Chin, M. H. W.** & Day, R. M. Phase-separation technologies for 3D scaffold engineering in Functional 3D Tissue Engineering Scaffolds (eds Deng,Y. & Kuiper, J.) (Woodhead Publishing, 2018), 101–126. isbn: 978-0-08-100979-6. https://doi.org/10.1016/B978-0-08-100979-6.00005-7.

Software/codes:

1. 3D Cell Scaffold Generator (3D CSG). Open source license: GPL-3.0. Available at GitHub: https://github.com/mattychin/3D-cell-scaffold-generator. A Grasshopper algorithm for generating 3D printable scaffolds with small-world network properties.

PRESENTATIONS

1. **Chin, M. H. W.**, Vimeux, L., Guilbert, T., Benhammou, I., Lachina, V., Yadav, S., Reid, B., Straathof, K., Acton, S., Donnadieu, E. & Coppens, M.-O. Extracellular Matrix-Inspired 3D Microprinted Tumor Microenvironment Models. AIChE Annual Meeting, 2024, San Diego, US; Oral presentation.
2. **Chin, M. H. W.**, Vimeux, L., Guilbert, T., Donnadieu, E. & Coppens, M.-O. Bioinspired 3D Microprinted Tumour Microenvironment Models. BioMedEng24, 2024, London, UK; Oral presentation.
3. **Chin, M. H. W.**, Reid, B., Lachina, V., Acton, S. E. & Coppens, M.-O. Algorithmic Design of Lymph Node-Inspired 3D Microprinted Cell Scaffolds. AIChE Annual Meeting, 2023, Orlando, FL, USA; Oral presentation.
4. **Chin, M. H. W.**, Reid, B., Lachina, V., Acton, S. E. & Coppens, M.-O. An Algorithmic Design Approach to Generate Lymph Node-Inspired 3D Microprinted Cell Scaffolds. TERMIS-AP, 2023, Hong Kong; Poster presentation.
5. **Chin, M. H. W.**, Reid, B., Lachina, V., Acton, S. E. & Coppens, M.-O. Designing nature-inspired scaffolds to model 3D biophysical T cell dynamics for cancer immunotherapy. Cancer Grand Challenges: Future Leaders Conference, 2022, Barcelona, Spain; Poster presentation.
6. **Chin, M. H. W.**, Gentleman, E., Coppens, M.-O. & Day, R. M. Transforming Immunotherapy with Nature-Inspired Engineering. AIChE Anuual Meeting, 2018, Pittsburgh, PA, USA; Oral presentation.
7. TERMIS World Congress, 2018, Kyoto, Japan; Poster presentation.
8. **Chin, M. H. W.**, Gentleman, E., Coppens, M.-O. & Day, R. M. Biophysical fine-tuning of immune cell behaviour by using a biomaterial-based culture platform. 19th IUPAB and 11th EBSA Congress, 2017, Edinburgh, UK; Poster presentation.
9. **Chin, M. H. W.**, Gentleman, E., Coppens, M.-O. & Day, R. M. A hydrogel-based platform for the *ex vivo* activation and expansion of T cells. TERMIS-EU, 2017, Davos, Switzerland; Poster presentation.
10. A biomaterial-based platform for the optimisation of therapeutic immune cell culture. ChemEngDayUK, 2017, Birmingham, UK; Oral + poster presentations.
11. Bower, I., Chi, W., **Chin, M. H. W.**, Fan, S., Kopniczky, M., Pilcher, J. & Strutt, J. Project Plasticity. iGEM World Championship, 2013, Massachusetts Institute of Technology, Cambridge, MA, USA; Oral + poster presentations.
12. Bower, I., Chi, W., **Chin, M. H. W.**, Fan, S., Kopniczky, M., Pilcher, J. & Strutt, J. Project Plasticity. iGEM European Final, 2013, INSA Lyon, Lyon, France; Poster presentation.

FUNDING

Fellowships / Research grants

1. Marie Sklodowska-Curie Actions Global Fellowship (European Commission), US host: Harvard University (2 years), UK host: UCL (1 year), €430.3k (2025)
2. CNIE Inspiration Grant, £20.4k, 9 months; PI: myself, collaborator: Dr. Sophie Acton (Laboratory of Molecular Cell Biology, UCL) (2021).
3. Vinson & Cissy Chu Charitable Foundation, £25k, 6 months (2020).
4. UCL Grand Challenges Doctoral Students' Small Grants Scheme (category: Transformative Technology), £2k, 12 months (2017).

Travel grants

1. International Travel Award, IET, £1500 (2024).
2. Andrew Carnegie Research Fund, IOM3, £250 (2017).
3. Research Student Conference Fund, IOP, £200 (2017).
4. Young Scientist Travel Award, IUPAB, €300 (2017).
5. Travel Bursary, Wellcome Trust and British Biophysical Society, £500 (2017).
6. School of Life and Medical Sciences Graduate Conference Fund, UCL, £876.74 (2017).

SUPERVISING AND MENTORING

1. Treena Villanueva, MEng dissertation (2025)
2. Nur Qaliesya Afzainizam, MEng dissertation (2025)
3. Lucy Todd, PhD thesis (2021-2024).
4. Yecheng (Max) Zhang, MEng dissertation (2024).
5. Klara Burdova, MEng student assisting with research on a volunteering basis (2024).
6. Julia Linke, PhD thesis (2021).

PUBLIC ENGAGEMENT / OUTREACH

1. Showcased research to alumni, UCL Chemical Engineering Centenary Alumni Event (2024).
2. Presenter – Showcased research to secondary school (Year 12) students (2024).
3. Mentor – In2Research, a placement program aiming to improve access to postgraduate research degrees and careers for people from low socioeconomic backgrounds (2022-2024).
4. Presenter – "Shaping a Sustainable Future: Transformative Technology" public engagement event at UCL (2023).

ACADEMIC SERVICE / OTHER ACTIVITIES

1. Workshop Organiser (2024) – Organised a workshop with University of Oxford, Engineering Science DPhil students to exchange research ideas and explore collaborative opportunities with UCL Centre for Nature Inspired Engineering.
2. Invited Reviewer (2023) – Advanced Science (Wiley).
3. Ambassador of Automorph Network (06/2023-Present) – a collaboration between scientists and designers, working together on the concept of self-shaping matter.
4. Early Career Researcher Board Member, UCL Institute of Healthcare Engineering (09/2018 - 01/2019).
5. Member – Royal Society of Biology; Institute of Materials, Minerals and Mining; Institution of Engineering and Technology; Institute of Physics; Tissue Engineering and Regenerative Medicine International Society; UK Society for Biomaterials; American Institute of Chemical Engineers (PostDoc membership).