

Henry Yu, Ph.D.

**Tenured Professor | Scientist-Entrepreneur |
Pioneer in 3D Biological Modelling**

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Affiliations:

- Department of Physiology, Yong Loo Lin School of Medicine, & NUS College, National University of Singapore
- Mechanobiology Institute (MBI), National University of Singapore
- Institute of Digital Medicine (WisDM) Translational Research Programme, NUS Medicine
- Interdisciplinary Science and Engineering Programme (ISEP), NUS Graduate School
- National University Health System (NUHS) Research Core Facilities

1. Executive Summary / Professional Profile

Dr Henry Yu is a Tenured Professor at the National University of Singapore (NUS). As a pioneer in biomedical engineering and 3D biological modelling in Singapore, Dr Yu specializes in the precise control of cellular microenvironments, integrating multidisciplinary technologies to create 3D micro-tissue structures such as organoids, organs-on-chips, and microphysiological systems.

Distinct from many academic peers, Dr Yu possesses an exceptional capacity for technology translation and commercialization. Over a career spanning nearly three decades, he has successfully integrated technologies across cell biology, bioengineering, materials science, microfluidics, and data science to develop robust commercial solutions for the industry. He has applied for over 50 patents and successfully commercialized multiple technologies, leading to the establishment of a

number of technology start-ups in the fields of diagnostics, drug and toxicology testing, imaging analysis, cell therapy, and alternative protein foods. His entrepreneurial success has been recognized with the A*STAR Scientist-Entrepreneur Award, which he won twice (2013 and 2016), and he serves as a board member for publicly listed companies, holding membership in the Singapore Institute of Directors.

Dr Yu has published over 250 high-quality journal articles and 250 conference papers, including major discoveries in top-tier journals such as *Science* and *Nature* sister journals. He is highly adept at utilizing optical imaging and data modelling to develop quantitative analysis tools for *in vitro* models, dramatically increasing their interpretability and data utilization value. As a leader, he routinely manages cross-disciplinary research teams and technical platforms across multiple institutions, overseeing research funding in excess of US\$50 million. With a global perspective shaped by education and research across three continents, Dr Yu maintains an extensive academic, clinical, and industrial network, having served as a scientific advisor, expert panellist, and collaborator for world-leading universities, regulatory bodies, and pharmaceutical companies globally.

2. Education and Appointments

Education

- **Postdoctoral training:** European Molecular Biology Laboratory (EMBL), Heidelberg, Germany (1995-1997)
- **Ph.D. in Cell Biology:** Duke University, Durham, NC, USA (1990–1994). Supervisor: Michael P. Sheetz (2012 Lasker Basic Medical Research Award)
- **M.S. in Molecular Biology and Biochemistry:** Washington University Medical Center, St. Louis, MO, USA (1988–1990).
- **B.S. in Biochemistry (High Honour):** Honours College, Michigan State University, E. Lansing, MI, USA (1984–1987).
- **Certifications:** 3D Microscopy of Living Cell (University of British Columbia); Analytical and Quantitative Light Microscopy (Marine Biological Laboratories, Woods Hole).

Current Positions

- **Tenured Professor** (2008-): Department of Physiology, Yong Loo Lin School of Medicine, National University of Singapore (NUS)
- **Professor** (2018-): University Scholars Programme (now NUS College), NUS
- **Principal Investigator** (2009-): Mechanobiology Institute (MBI), Singapore
- **Principal Investigator** (2020-): Institute of Digital Medicine (WisDM) Translational Research Programme, NUS Medicine
- **Director** (2000-): NUHS Research Core Facilities, Flow Cytometry Laboratory
- **Faculty Member** (2003-): NUS Graduate School of Integrative Sciences and Engineering
- **Guest Professor** (2026-): Suzhou Institute of Nano-tech and Nano-bionics, Chinese Academy of Sciences (Organoid Research Center)

Notable Previous Positions

- **Director, NUHS Research Core Facilities, Confocal Microscopy Unit** (2000-2025), National University Health System (NUHS)
- **Senior Principal Investigator** (2003-2023): Institute of Bioengineering and Bioimaging (IBB), A*STAR, Singapore (<https://www.astar.edu.sg/ibb/home>)
- **Co-Lead Principal Investigator** (2019-2025): Critical Analytics for Manufacturing Personalized-Medicine (CAMP), Singapore-MIT Alliance for Research and Technology (SMART)
- **Visiting Professor** (2016-2019), Gastroenterology department, Southern Medical University, China
- **Visiting Professor** (2011-2014) Department of Biological Engineering, Massachusetts Institute of Technology (MIT), USA
- **Visiting Professor** (2009-2010) Department of Mechanical Engineering, Massachusetts Institute of Technology (MIT), USA

- **SMA Faculty Fellow**, Deputy Program Co-Chair, & Graduate Committee Chair (2005-2010) Computational and Systems Biology Program, Singapore-MIT Alliance (SMA); Acting Program Co-Chair (1st April – 31st Dec, 2008)
- **Founding Co-Chairman** (2001-2005) Graduate Program in Bioengineering (GPBE) National University of Singapore (<http://gpbe.nus.edu.sg>)
- **Human Frontier Science Program (HFSP)**, <http://www.hfsp.org>) **Long-Term Research Fellow** (1995–1997) at the European Molecular Biology Laboratory (EMBL), Heidelberg, Germany (<http://www.embl-heidelberg.de>)

3. Entrepreneurship, Commercialization & IP

Prof. Yu has established a distinguished track record of translating complex laboratory innovations into viable, market-ready corporate ventures. He has founded four start-up companies, supported the early-phase development of two other technical companies, and actively manages a robust IP portfolio of over 50 patents.

Selected Start-ups & Corporate Roles

- **Invitrocue Ltd (Publicly Listed Company in Australia)**: Founder, Technical Advisor, and Non-Executive Director (2014–Present). Successfully commercialized 3D cell-based assays for drug toxicology and personalized oncology testing.
- **HistoIndex Pte Ltd**: Founding Scientist (2010–Present). Commercialized optical imaging and AI-based digital pathology solutions for quantitative fibrosis scoring.
- **Cordlife Pte Ltd (CyGenics Ltd)**: Non-Executive Director (2001–2004) and Scientific Advisory Board Member (2004–2014).
- **Chinese Academic Link, Inc., USA**: Board Director (1996–1997).

Research Funding

- Secured over **US\$50 Million** in direct costs across numerous national and international research grants, leading highly translational platforms.

Selected Commercialized & High-Impact Patents (from >50 filed)

1. **qFibrosis / Translation of Qualitative Pathology to Quantitative Features:**
A method and system for assessing fibrosis in tissue. Licensed and commercialized (US Patent Grant No: US 9710908).
2. **Cleavable Macroporous Cellulosic Sponge for 3D Cell Culture and Spheroid Retrieval:** Licensed technology foundational to 3D personalized cancer organoid screening (US Patent Publication No: US20140080214 A1).
3. **A Digital CRISPR-Based Method for Rapid Detection and Absolute Quantification of Viral Nucleic Acids:** Innovative IP enabling rapid universal detection of microbial contaminations, highly relevant to cell and gene therapy manufacturing (WO 2022/093127).
4. **Bioactive Surface for Hepatocyte-Based Applications (SteatoChip technologies):** Licensed technology for drug hepatotoxicity and NAFLD/NASH screening models (US Patent Publication No: US20110053783 A1).
5. **Micropatterned Pluripotent Stem Cell Differentiation for In Vitro Human Development Toxicity Testing:** A morphological assay for early teratogen screening (US Patent Grant No: 2900807).

4. Key Honors & Awards

- **A*STAR Scientist-Entrepreneur Award (2016)** – For InvitroCue Pte Ltd.
- **A*STAR Scientist-Entrepreneur Award (2013)** – Team Leader for HistoIndex Pte Ltd.
- **WIPO-IPOS IP Award for IP Champions (2017)** – Recognized by the Intellectual Property Office of Singapore (IPOS) for InvitroCue Pte Ltd.
- **Young Researcher Award (2002)** – National University of Singapore.
- **Long Service Medal (2022)** – Singapore National Day Awards.
- **Yong Loo Lin School of Medicine Researcher of the Year Award (AY2019/2020)** – National University of Singapore.

- **Human Frontier Science Program (HFSP) Long-Term Research Fellowship** (1995–1997).

5. Selected Research Publications

Prof. Yu has authored over 250 journal articles, 250 conference papers, and a foundational textbook. Below is a curated selection demonstrating translational leadership in organ-on-a-chip, AI/machine learning diagnostics, and advanced 3D biomaterials.

Textbook:

- Sheetz, M., and **Yu, H.** (2018). *The Cell as a Machine*, Cambridge University Press, ISBN: 9781107052734.

Selected Journal Articles:

1. Balachander, G.M., ... **Yu, H.** (2025). LEADS - A comprehensible human liver-on-a-chip for non-alcoholic steatohepatitis (NASH) drug testing. *Lab on a Chip*, 25(14):3444-3466.
2. Huang, X., ... **Yu, H.** (2025). HIVIL: A Human In vitro Inflammatory Liver Model Recapitulates Immune-associated Drug effects with High Predictivity. *NAM Journal*, 1: 100032.
3. Wu, X., ... **Yu, H.** (2025). Rapid Universal Detection of High-Risk and Low-Abundance Microbial Contaminations in CAR-T Cell Therapy. *Small Methods*, 2500253.
4. Bennie, R.Z., ... **Yu, H.**, ... (2025). A risk-based approach can guide safe cell line development and cell banking for scaled-up cultivated meat production. *Nature Food*, 6: 25-30.
5. Jiang, X., ... **Yu, H.** (2024). Three-dimensional liquid metal-based neuro-interfaces for human hippocampal organoids. *Nature Communications*, 15: 4047.
6. Luo, X., ... **Yu, H.** (2024). Rapid Endoscopic Diagnosis of Benign Ulcerative Colorectal Diseases with an Artificial Intelligence Contextual Framework. *Gastroenterology*, S0016-5085(24)00365-2.
7. Zhao, Z.X., ... **Yu, H.** (2022). Organoids. *Nature Reviews Methods Primers*, 2(1): 94.

8. Wu, X., Chan, C., Springs, S.L., Lee, Y.H., Lu, T.K., and **Yu, H.** (2022). A warm-start digital CRISPR/Cas-based method for the quantitative detection of nucleic acids. *Analytica Chimica Acta*, 1196: 339494.
9. Luo, X., ... **Yu, H.** (2021). Artificial intelligence-enhanced white-light colonoscopy with attention guidance predicts colorectal cancer invasion depth. *Gastrointestinal Endoscopy*, 94(3): 627-638.
10. Wu, X., ... Lu, T.K., and **Yu, H.** (2021). A Digital CRISPR-based Method for the Rapid Detection and Absolute Quantification of Viral Nuclei Acids. *Biomaterials*, 274: 120876.
11. Teng, Y., ... **Yu, H.** (2021). A scalable and Sensitive Steatosis Chip with Long-Term Perfusion of in situ Differentiated HepaRG Organoids. *Biomaterials*, 275: 0120904.
12. Fong, L.S.E., ... **Yu, H.** (2018). Generation of Matched Patient-Derived Xenograft In Vitro-In Vivo Models Using 3D Macroporous Hydrogels for the Study of Liver Cancer. *Biomaterials*, 159: 229-240.
13. Yu, Y., ... **Yu, H.** (2018). Deep learning enhances automated scoring of liver fibrosis stages. *Scientific Reports*, 8: 16016.
14. Li, Q., ... **Yu, H.**, and Viasnoff, V. (2016). Extracellular matrix scaffolding guides lumen elongation by inducing anisotropic intercellular mechanical tension. *Nature Cell Biology*, 8: 311-318.
15. Kumar, J., **Yu, H.**, and Sheetz, M.P. (1995). Kinectin, an essential anchor for kinesin-driven vesicle motility. *Science*, 267(5205): 1834-1837.

6. Selected Keynote Presentations

Prof. Yu has delivered over 250 invited and keynote lectures globally. The following is a curated selection of his keynote addresses at major international conferences, highlighting his translational leadership in 3D tissue engineering, organ-on-a-chip systems, and future foods.

- **International Conference on Advances and Challenges in Medical Technology Translation (TransMed2024):** "3.5D organoid based tissue constructs." Thiruvananthapuram, India, December 2024.
- **4th Conference on Micro Flow and Interfacial Phenomena (μ FIP):** "3.5D Organoid Engineering strategy." Hong Kong, June 2024.
- **Food Science & Technology Global 2021:** "Meat-like Scaffold for Cell-based Meat Cuts." April 2021.
- **2021 AFOB Virtual Conference:** "Engineering the third dimension of organoids." November 2021.

- **9th WACBE World Congress on Biomedical Engineering (WACBE 2019):** "Causation & correlation in modeling complex function and disease." Taipei, Taiwan, August 2019.
- **21st International Conference of Molecular Engineering of Polymers (MEP2018):** "Development of macroporous hydrogel sponges for soft tissue organoid culture and applications." Shanghai, China, September 2018.
- **Tissue Engineering and Regenerative Medicine International Society (TERMIS-AP 2017):** "Local cytoskeleton dynamics in liver homeostasis and regeneration." Nantong, China, September 2017.
- **7th International Multidisciplinary Conference on Optofluidics (Optofluidics 2017):** "Chips and systems for more complex drug testing applications." Singapore, July 2017.
- **10th World Biomaterials Congress:** "Mechanobiology opens the black boxes of cell responses to biomaterials." Montreal, Canada, May 2016.
- **Tissue Engineering and Regenerative Medicine International Society (TERMIS-AP 2016):** "Materiomic Screening of Topographical Cues That Bias Migration and Differentiation of Liver Progenitor Cells." Taipei, Taiwan, September 2016.
- **Lab-on-a-Chip Asia:** "Interface structures and functions for Organs-on-Chip." Singapore, November 2013

7. Leadership, Advisory, Industry Networks & Mentorship

Prof. Yu brings profound strategic oversight globally, navigating between deep academia, regulatory bodies, and multinational corporations. He frequently evaluates complex international grants and directs highly collaborative, cross-border research initiatives.

Expert Panels & Consulting

- **Grant Evaluator & Consultant:** Conducted extensive grant and program reviews globally, including for the **Euro 189M** Euro-BioImaging project (German national roadmap of research infrastructures), the Dutch Research Council (NWO), the Hong Kong Innovation and Technology Commission (ITC), and the New Zealand Ministry of Business, Innovation, and Employment (MBIE).

- **Government & University Advisor:** Served on expert panels for governments and leading universities across Germany, Japan, Israel, Netherlands, Finland, China, and the Hong Kong SAR.

Scientific Advisory Boards & Industry Networks

- **Advisory Boards:** Member of the Advisory Board for Biotech Connection Singapore (BCS) and Scientific Advisory Board for REGEA Institute of Regenerative Medicine (Finland).
- **Global Industry Collaboration:** Established strategic R&D relationships with world-leading pharmaceutical and diagnostic companies, developing bespoke organ-on-a-chip models for commercial R&D pipelines.
- **HESI Global:** Member of the DART Technical Committee (Health and Environmental Sciences Institute).

Program Leadership

- **Founding Co-Chair:** The NUS Graduate Program in Bioengineering (GPBE).
- **Deputy Program Co-Chair / Graduate Chair:** Computational and Systems Biology Program, Singapore-MIT Alliance (SMA).
- **Founding Chair:** Academic Affairs and Graduate Committee, Mechanobiology Institute (MBI), Singapore.

Mentorship & Global Talent Network

Prof. Yu's extensive mentorship has cultivated a powerful global network. Many of his former students and staff have successfully transitioned into high-level academic professorships, multinational corporate executive roles, and successful technology entrepreneurship.

- **Selected Academic Leaders:**
 - **Du Yanan** (Tenured Professor, Vice Dean, Biomedical Engineering, Tsinghua University).
 - **Yi-Chin Toh** (Tenured Professor, Queensland University of Technology)

- **Jun Li** (Tenured Professor, Biomedical Engineering, NUS)
- **Ma Nan** (Tenured Professor, Free University of Berlin)
- **Si Ke** (Tenured Professor, Vice Dean, Zhejiang University)
- **Leo Hwa Liang** (Tenured Assoc. Professor, National University of Singapore)
- **Eliza Fong** (Asst. Professor, National University of Singapore)
- **Corporate Executives & Entrepreneurs:**
 - **Boon Siew Seah** (Director, Accenture SEA)
 - **Liu Zheng** (High Commissioner, Alibaba Group)
 - **Abhishek Ananthanarayanan** (Global Therapeutic Areas Lead, Innovation and Development, Abbott)
 - **Dean Tai** (Co-founder & Chief Scientific Officer, HistoIndex)
 - **Zhang Zhiyong** (Founder and CEO of REGEN-αGEEK (Haining) Biotechnology Co., Ltd and Professor, Guangzhou Medical University)
 - **Pan Xiaotao** (Founder and CEO of Shanghai Fugai Optical Technologies Co. Ltd.)
 - **Li Qiushi** (Founder and CEO of GeneVide Biotech Co., Ltd.)
- **Clinicians:**
 - **Chang Shi** (Vice President, Xiangya Hospital, Central South University)
 - **Tuo Xiaoye** (Associate Chief Physician, Peking University Shougang Hospital)
 - **Muhammad Ali Shazib** (Founding Dean and Chief Clinical Officer, Workman School of Dentistry, High Point University, USA).