



Department of
Mechanical Engineering
The University of Hong Kong



Tam Wing Fan
Inno Wing Two

FACULTY OF ENGINEERING

TITLE: Small-scale Medical Robots down to Cell Size inside Our Body

(onsite and online)

Seminar organized by the Department of Mechanical Engineering

Date: October 20, 2025 (Monday)
Time: 3:00 PM–4:30 PM (Hong Kong Time)
Venue: The Tam Wing Fan Innovation Wing Two
HKU

Speaker: Professor Metin Sitti
Koç University, Turkey

Zoom Online Lecture:
<https://tinyurl.com/4sv8ya8j>
Meeting ID: 943 6461 8198
Password: 436290



Abstract:

Wireless small-scale medical robots have the unique capability of navigating, operating and staying inside hard-to-reach, tight, risky and deep sites inside our body. This talk reports our recent milli- and microscale wireless miniature medical robots down to cell size that could achieve various minimally invasive medical functions, such as targeted active drug delivery, neural stimulation, clot opening, liquid biopsy, biofluid pumping, cauterization, and hyperthermia. Due to miniaturization limitations on on-board actuation, powering, sensing, computing and communication, new materials and methods need to be introduced in creating and controlling such robots. Moreover, they need to be tracked under medical imaging modalities, such as ultrasound, fluoroscopy, photoacoustic imaging, and MRI, for their precise and safe operation. 3D microprinting and assembly-based fabrication methods and biocompatible and multifunctional soft composites with embedded micro/nanomaterials are proposed to create novel medical milli/microrobots. Soft-bodied medical miniature robot designs enable active shape programming-based adaptive, multimodal and multifunctional navigation and functions, and safe operation. External physical forces, such as magnetic fields, acoustic waves and light, and physical or chemical (e.g., catalytic) interactions with the operation medium are used to actuate and steer such miniature robots wirelessly as a single robot or robot collectives. These robots are aimed to save lives of more patients by curing diseases not possible or hard to cure and decrease the side effects and invasiveness of disease treatments drastically.

Biography:

Prof. Dr. Metin Sitti is the President of Koç University in Istanbul, Turkey since fall 2023. Formerly, he was a Director of the Physical Intelligence Department at Max Planck Institute for Intelligent Systems, Germany (2014-2023), Professor at ETH Zurich, Switzerland (2020-2024), Professor at Carnegie Mellon University, USA (2002-2014), and Research Scientist at UC Berkeley, USA (1999-2002). He received his BSc (1992) and MSc (1994) degrees from Boğaziçi University, Turkey, and PhD degree from University of Tokyo, Japan (1999). His research interests include wireless medical devices, small-scale mobile robots, bioinspiration, and physical intelligence. He is a member of National Academy of Engineering in USA, Academy Europea, and Max Planck Society (2014-2023). He received the Highly Cited Researcher recognition (2021-2025), Frontiers of Science Award (2025), Materials Science Leader Award (2023-2025), Breakthrough of the Year Award in the Falling Walls World Science Summit (2020), ERC Advanced Grant (2019), Rahmi Koç Science Medal (2018), SPIE Nanoengineering Pioneer Award (2011), and NSF CAREER Award (2005). He has supervised and mentored over 70 (18 current) PhD students and 80 (10 current) postdocs, where over 65 of his group alumni are professors around the world. He has published 2 books and over 420 journal articles and has over 30 patents. He founded Setex Technologies Inc. to commercialize his lab's gecko-inspired microfiber adhesive technology. He is the editor-in-chief of Journal of Micro-Bio Robotics journal and associate editor in Science Advances journal.

ALL INTERESTED ARE WELCOME

For further information, please contact Prof. Nicholas Fang at 3917 2639.