



The 52nd Biomechanics Seminar

2026 Sep 25 (Fri) 16:00~17:00

Kyoto University, Institute for Life and Medical Sciences

Institute for Life and Medical Sciences Bldg. No.1 / 1st floor Conference Room (#134)

<https://www.infront.kyoto-u.ac.jp/en/access/>

**Title: 3D Cellular Microenvironments
to Study Cell Mechanics**

Lecturer: Martin Bastmeyer, Ph.D.
Professor, Head of the Department
Zoological Institute, Cell- and Neurobiology
Karlsruhe Institute of Technology (KIT), Germany



Abstract: Cell behavior and differentiation are not only influenced by biochemical cues but also by physical properties like adhesive geometry, topography, and stiffness of the 3D extracellular environment. Correspondingly, cells exert, sense, and respond to physical forces. I will discuss how 3D laser nanoprinting can be applied to design 3D cellular microenvironments with defined geometries and adjustable flexibility to study the interplay between extracellular physical factors and cell function in a systematic approach. Measurements of cell adhesion forces in relation to adhesion geometry are also feasible. In collaboration with chemists we have developed stimuli-responsive resists for 3D printing. These hydrogels change their mechanical properties upon external stimuli and have great potential for applications to study cellular mechanobiology. We have manufactured a miniaturized device that can be used to mechanically stretch single cells in a well-defined temporal and spatial manner and to simultaneously measure cellular contraction forces. In combination with knockout cell lines of proteins involved in cellular force production (e.g., non-muscle myosin II isoforms, α -actinin isoforms) this system will allow to study the molecular basis and regulation of force generation by non-muscle cells.

Language: English

Inquiry: [Biomechanics Lab](#), LiMe, Kyoto University / Masahiro Kumeta (kumeta.masahiro.4r@kyoto-u.ac.jp)
Taiji Adachi (adachi@infront.kyoto-u.ac.jp)