

41st IIR-ASMat Seminar (IIR-ASMat & CLS 合同セミナー)

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Programming DNA Matter Inspired by Life and Interfacing with Life

DNA offers a powerful materials platform to program life-like behavior in synthetic matter and to interface with living systems. In our work, we develop DNA-based artificial cells as programmable, non-equilibrium compartments that go beyond passive encapsulation. Sequence-encoded phase behavior and dense DNA condensation give rise to rich internal physics, including non-Fickian transport, viscoelastic confinement, artificial cytoskeletons, and nucleus-like domains. Coupling these compartments to DNA reaction networks and strand-displacement circuits enables chemical sensing, information processing, adaptive responses, communication, and collective protocellular behavior. In a complementary direction, we use DNA nanotechnology to advance mechanobiology at living interfaces. Programmable aptamer mechanoreceptors and nuclease-resistant L-DNA tension probes enable cell-specific, long-term mapping of molecular forces with temporal control. By integrating DNA mechanics with molecular circuits, these systems move beyond force readout toward conditional signal processing at the biointerface. Together, these approaches position DNA as a unifying platform to study mechanochemical feedback and adaptive behavior across synthetic and living matter.

日時：2026年10月26日（月）15:00~16:00

場所：東京科学大学 横浜キャンパス S3棟 (すずかけ台図書館) 1階 セミナールーム

Zoom配信: <https://zoom.us/j/93836002792?pwd=xKAXgdbzVOgV5bjPO3u4JD4UcFhMvN.1>

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