

MIKLÓS KELLERMAYER



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RESEARCH AREA

Molecular manipulation with lasertweezers and atomic force microscopy. Spatially and temporally synchronized single molecule mechanical and fluorescence measurements.

Mechanisms of actomyosin interaction using in vitro motility assay. Structure and mechanical stability of myosin molecules and thick filaments.

Molecular biophysics of cytoskeletal and extracellular filamentous proteins. Molecular biophysics of titin giant muscle protein. Domain-level regulation of titin flexibility and stability. Mechanosensing mechanisms in titin. Nanomechanics of the desmin intermediate filament. In situ and in vitro collagen elasticity. Molecular mechanisms of fibrin polymerization and elasticity. Molecular mechanics of DNA, RNA and protein complexes. Force-driven conformational changes of von Willebrand Factor.

Structure of beta amyloid and systemic amyloid fibrils. Mechanical manipulation of individual amyloid fibrils.

Measurement of viral capsid structure and nanomechanics by AFM, mechanically driven DNA ejection, high-resolution structure and interactions of the tail complex. Nanobiophysics of SARS-CoV-2 virus.

Mechanical manipulation of liposomes and cochleates by AFM. Biodistribution of liposome and cochleate particles.

TECHNIQUES AVAILABLE IN THE LAB

Optical tweezers, atomic force microscopy, super-resolution (STED microscopy, single-molecule biophysics, nanotechnology, nanobiotechnology, protein purification and structural analysis, virus isolation and topographical analysis, spectroscopy modalities (absorption, fluorescence), in vivo image analysis methods.

SELECTED PUBLICATIONS

Kretzer, B., Herényi, L., Csík, G., Supala, E., Orosz, Á., Tordai, H., Kiss, B., **Kellermayer, M.** (2024) TMPyP binding evokes a complex, tunable nanomechanical response. **DNA Nuc Ac Res** **52**: 8399.

Kellermayer, D., Tordai, H., Kiss, B., Török, G., Péter, DM., Sayour, AA., Pólos, M., Hartyánszky, I., Szilveszter, B., Labeit, S., Gángó, A., Bedics, G., Bödör, C., Radovit, T., Merkely, B., Kellermayer, MS. (2024) Truncated titin is structurally integrated into the human dilated cardiomyopathic sarcomere. **J Clin Invest** **134**(2): e169753.

Szebeni, J., Kiss, B., Bozó, T., Turjeman, K., Levi-Kalisman, Y., Barenholz, Y., **Kellermayer, M.** (2023) Insights into the Structure of Comirnaty Covid-19 Vaccine: A Theory on Soft, Partially Bilayer-Covered Nanoparticles with Hydrogen Bond-Stabilized mRNA-Lipid Complexes **ACS Nano** **17**(14): 13147-13157.

Haluszka, D., Aminmansour, S., Tóth, P., Aminmansour, S., **Kellermayer, M.** (2022) Nanomechanical and Nonlinear Optical Properties of Glycated Dental Collagen. **J Dent Res** **101**(12): 1510-1516.

Kiss, B., Kis, Z., Pályi, B., **Kellermayer, MSZ.** (2021) Topography, Spike Dynamics, and Nanomechanics of Individual Native SARS-CoV-2 Virions. **Nano Lett** **21**(6): 2675-2680.