学術変革Bスケール横断分析セミナー
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Engineering in Medicine and Biology Seminar

Mechano-Physical Profiling of Single Cells Using a Microfluidic Resonator

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The mechanical and physical properties of cells—such as mass, volume, density, and stiffness—provide critical insights into cellular state and function. These properties play key roles in regulating biological processes, including cell migration, development, differentiation, and disease progression (e.g., cancer metastasis). In this talk, I will introduce a technology that enables precise measurements of mechanical and physical properties at the single-cell level. Our approach leverages a Suspended Microchannel Resonator (SMR)—a vibrating cantilever integrated with microfluidic channels. By analyzing shifts in resonance frequency as cells pass through its embedded channel, the SMR can accurately quantify cellular mass, volume, density, and stiffness. I will conclude by discussing applications of this technology in studying cell development and cancer progression, highlighting how single-cell measurements can deepen our understanding of biological processes.

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