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Nanobiomechanics of biological cells for biomedical applications

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Nanobiomechanics has been emerging as a powerful technology to characterize mechanical characteristics of living cells for biomedical applications, including disease detection, drug delivery, and tissue engineering. Since the biomechanical measurement of cellular forces normally requires force and displacement at nano-scale resolutions, such a challenge can be resolved only due to the recent development in nanobiomechanical instruments, including Atomic Force Microscope (AFM), optical tweezers, and nanoindentation. In this talk, we will focus on the state-of-the-art of the advanced techniques for biomechanical testing and their potential applications for the future biomedicine. Because research in this cross-disciplinary topic spreads in publications of various areas from physical sciences and engineering to biology and medicine, this renders it difficult for scientists working in this topic to access comprehensive updated information in the area. As a result, this talk is aiming to bring these research works together so researchers can have an overview of the recent advances in nanobiomechanics, with a particular focus to the measurement and application of cellular biomechanical properties at nano-scale. Nanobiomechanics has recently been regarded by 10 most significant technologies by technology review published by MIT. Breakthrough of the measurement for highly complex and dynamic living cells has not only opened a new horizon in scientific research but also generated a significant social impact. For example, measuring nanoscale forces exerted by proteins on cells can potentially produce new exploration of various diseases. Such single biomechanical markers will provide low-cost, less-invasive and higher-through diagnostic techniques.

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