Condensed Matter Physics Seminar
Department of Physics, National Taiwan University

Optical Trapping and Manipulation for Biomedical Applications

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Time 14:20-16:20

Location R833
Dept. of Physics / Center for Condensed Matter
National Taiwan University

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All Are Welcome!

Abstract

For more than a decade, it has been established that optical tweezers can be used not only for trapping and manipulation of one or more particles ranging from tens of nanometers to a few tens microns, including living cells, cell organelles, and bacteria, but also as a sensitive force transducer for the measurement of molecular interactions in the range of sub-pico-Newton to hundreds of pico-Newtons. Besides, a counter-propagating dual-beam optical stretcher has been used to trap and stretch individual red blood cells and other living cells to study the cellular viscoelastic properties non-invasively and without any mechanical contact with potential novel applications in cell-deformability-based disease diagnosis. Recently, we have shown that oscillatory optical tweezers implemented with an acousto-optic modulator (AOM) to scan the focal spot of the trapping beam in either sinusoidal mode or in discrete jumping mode are complementary to the stationary optical tweezers in a wide variety of biomedical applications. In addition, blinking optical tweezers can help extend the signal integration-time, and hence extend the low frequency regime in the measurement of viscoelasticity via particle tracking microrheology. In this talk, a few selected examples will be presented to highlight the principles and the potential biomedical applications of these approaches.

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