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2314.2 Board # B690.2

Scanning Confocal Microscope for High-throughput Anaylsis of Single DNA Structural Fluctuations

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We present a fully automated and programable single molecule confocal microscope for analyzing immobilized single pair FRET systems. The instrument automatically finds the sample surface, locates individual molecules and records photons versus time for the donor and acceptor signals. Typically, photon traces from a few thousand molecules were acquired at 1 kHz for up to 10 seconds. Traces which showed donor and acceptor intensity transitions were used to obtain distributions of FRET efficiencies and lifetimes. Using this instrument, we studied the fluctuations in FRET signals from DNA hairpins containing donor and acceptor pairs conjugated internally on opposite strands. Preliminary results give evidence of local DNA denaturation, or "bubble" formation. We observe the lifetime of DNA bubbles to increase in AT- versus GC-rich regions. Bubble lifetime was also found to increase with elevated temperature and NaOH concentration.

The following abstract was printed incorrectly in the Onsite Addendum

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Self-Assembly of Two-Dimensional Peptide Nanostructures at Ordered Interfaces

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The ability to rationally control the assembly of molecules, especially biomolecules, lies at the core of new initiatives in bionanotechnology. In our previous in situ AFM studies of the self-assembly of a series of recombinant elastin peptides (EP) at raised temperatures (JACS, 2002, 124, 10648), we found that hydrophobic inter- and intra- molecular interactions conspired to direct the assembly of molecules into well-defined two-dimensional fibril structures. We report here the results of a comparison AFM and DLS study of EP-I assembly in solution and on HOPG surface. Although preliminary in scope, we believe that rational exploitation of secondary structure motifs can be used to direct molecular assembly at solid interfaces, and may ultimately allow us to control the orientation and architecture of protein-based nanostructures.