Single Molecule Imaging and Manipulation with Optical Techniques

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In recent years a number of purely optical techniques have been applied to image and manipulate single molecules. I will review recent results from my group that illustrate our program of trying to understand biophysics, one molecule at a time. We have been using optical tweezers to manipulate DNA molecules and to make ultra-sensitive force measurements, allowing new insights into the behavior of polymers. We have also been able to image single molecules ranging in size from DNA to fluorophores containing only 55 atoms. I will discuss our work developing microfluidic devices for single molecule analysis.