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**Femtosecond optical force microscopy**

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Investigating the nonlinear optical properties of individual nanoscale objects, including single molecules, requires exquisitely sensitive tools. Although several optical microscopy approaches have demonstrated single molecule sensitivity, the acquisition of the nonlinear optical response from individual objects with femtosecond resolution has remained a challenge. In this presentation, we will discuss a new type of microscopy, femtosecond optical force microscopy, which is designed to sensitively probe ultrafast excitation dynamics at the nanoscale. Optical force microscopy detects the molecular response after optical manipulation through minute changes in the force between an atomically sharp tip and the molecule. This approach achieves spectroscopy with femtosecond time resolution and 10 nm spatial resolution. We will highlight the principles of this technique and outline several applications in molecular spectroscopy, including measurements sensitive to excited state dynamics (pump-probe) and experiments that probe ground state vibrational dynamics (stimulated Raman).