

Biophysics at the Nanoscale: Single-Molecule Spectroscopy of Protein Folding and Dynamics

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ABSTRACT: Proteins are the most versatile constituents of the molecular machinery of life. Understanding their remarkable mechanisms of self-organization and their functional properties requires detailed knowledge of their structure and dynamics. Single-molecule spectroscopy provides an opportunity for investigating these properties on nanometer lengthscales and down to nanosecond times. Probing individual molecules can reveal structural and dynamic heterogeneity that would be hidden in the ensemble average. Förster resonance energy transfer (FRET) combined with correlation spectroscopy, microfluidics, and the quantitative analysis of photon statistics enable us to probe the equilibrium and non-equilibrium dynamics of biomolecules, even in complex environments, including live cells. A physical description of biomolecular behavior is becoming increasingly accessible via the synergy of experiment with analytical theory and molecular simulations.

ALL ARE WELCOME!