

Single molecule studies on the structure and dynamics of the nucleosome

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The nucleosome, the fundamental packing unit of the eukaryotic genome, is a macromolecular complex comprising DNA and an octameric histone protein core.

The structure and dynamics of the nucleosome is critically implicated in eukaryotic gene regulation. Based on single molecule fluorescence measurements, we study the effects of small and well-conserved epigenetic modifications on the nucleosome structure and dynamics. Our studies revealed that such modifications as DNA methylation, histone acetylation, and histone H3 replacement with CENP-A induce significant changes in the structure and dynamics of the nucleosome that may directly contribute to their regulatory functions. I will present our studies demonstrating how one can utilize single molecule fluorescence methods to probe the structures of static and fast fluctuating macromolecular complexes.