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Review

Imaging Live-Cell Dynamics and Structure at the Single-Molecule Level

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Observation of molecular processes inside living cells is fundamental to a quantitative understanding of how biological systems function. Specifically, decoding the complex behavior of single molecules enables us to measure kinetics, transport, and self-assembly at this fundamental level that is often veiled in ensemble experiments. In the past decade, rapid developments in fluorescence microscopy, fluorescence correlation spectroscopy, and fluorescent labeling techniques have enabled new experiments to investigate the robustness and stochasticity of diverse molecular mechanisms with high spatiotemporal resolution. This review discusses the concepts and strategies of structural and functional imaging in living cells at the single-molecule level with minimal perturbations to the specimen.



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