Type of presentation: Plenary

IMC-PL-6096 Bioimaging at the nanoscale -- Single-molecule and super-resolution fluorescence microscopy

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Dissecting the inner workings of a cell requires imaging methods with molecular specificity, single-molecule sensitivity, molecular-scale resolution, and dynamic imaging capability such that molecular interactions inside the cell can be directly visualized. Fluorescence microscopy is a powerful imaging modality for investigating cells largely owning to its molecular specificity and dynamic imaging capability. However, the spatial resolution of light microscopy, classically limited by the diffraction of light to a few hundred nanometers, is substantially larger than typical molecular length scales in cells. Hence many subcellular structures and dynamics cannot be resolved by conventional fluorescence microscopy. We developed a super-resolution fluorescence microscopy method, stochastic optical reconstruction microscopy (STORM), which breaks the diffraction limit. STORM uses single-molecule imaging and photo-switchable fluorescent probes to temporally separate the spatially overlapping images of individual molecules. This approach has allowed multicolor and three-dimensional imaging of living cells with nanometer-scale resolution and enabled discoveries of novel sub-cellular structures. In this talk, I will discuss the general concept, recent technological advances and biological applications of STORM.