Combined structure illumination with localization based super-resolution microscopy

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Abstract

Single Molecule localization based super-resolution microscope, known as PALM and STORM, has gained much interests in biology due to its high spatial resolution down to 10 nm and moderate laser power. However, its application to study the dynamics process in live cells is limited by its tremendous slow imaging process. On the other hand, Structure Illumination Microscopy can obtain video-rate imaging speed but lower spatial resolution. These limitation can be overcome by combining these two techniques together. Here, we describe an new developed microscope with this combination. Dynamics in live cells are fist observed in structure illumination mode. Small regions of interested are selected for further high-resolution imaging with STORM mode. The setup was used to study the dynamics of cell skeleton and fine structure at the cross of actin filaments.