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3D single molecule super-resolution imaging of cellular samples using MUM ANDREA GROSSO, ANISH ABRAHAM, Department of Electrical Engineering, UT Dallas, JEFFREY KANG, JERRY CHAO, RAMRAJ VELMURUGAN, SRIPAD RAM, STEPHEN ANTHONY, ZHUO GAN, E. SALLY WARD, Dept. of Immunology, UT Southwestern Medical Center, Dallas, TX, RAIMUND J. OBER, Department of Electrical Engineering, UT Dallas — Localization based super-resolution imaging techniques (e.g., PALM, fPALM, STORM, etc.) represent a powerful tool to image single molecules at nanoscale resolution in two dimensions. However, the extension of these techniques to three dimensions poses several technical challenges, foremost being the poor depth discrimination inherent to conventional microscopes which is typically used by these techniques. Previously, we developed an imaging modality, multifocal plane microscopy (MUM), which overcomes the poor depth discrimination capability of conventional microscopes. We also introduced a 3D localization algorithm MUMLA and demonstrated experimentally that it provides the best possible accuracy with which the 3D position of single molecules can be determined. Here, we extend the application of MUM and MUMLA for super-resolution imaging and demonstrate 3D imaging of single molecules at nanometer scale resolution in a cellular sample.

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