

## **Description of Additional Supplementary Files**

**Supplementary Movie 1:** Optical sectioning and 3D rotating reconstruction comparison of simulated 3D filament structure without and with noise.

**Supplementary Movie 2:** 2D reconstruction comparison of microtubules using different 2D-SIM methods.

**Supplementary Movie 3:** Depth-coded max-intensity-projection (MIP) reconstruction comparison of 3D microtubules and mitochondria using different 2D-SIM methods.

**Supplementary Movie 4:** Depth-coded MIP reconstruction comparison of two-color 3D microtubules and lysosomes using different 2D-SIM methods.

**Supplementary Movie 5:** Optical sectioning and 3D rotating reconstruction comparison of 3D microtubules using different 2D-SIM methods.

**Supplementary Movie 6:** Optical sectioning and 3D rotating reconstruction comparison of 3D mitochondria using different 2D-SIM methods.

**Supplementary Movie 7:** Optical sectioning reconstruction comparison of 3D mitochondria (region of interest) using different 2D-SIM methods.

**Supplementary Movie 8:** Optical sectioning and 3D rotating reconstruction comparison of 3D microtubules using Lock-in-SIM and 3D-SIM methods.

**Supplementary Movie 9:** Live-cell imaging of microtubules.

**Supplementary Movie 10:** Live-cell two-color imaging of the ER and lysosomes, including lysosome tubule-directed lysosome moving, and ER tubule and matrix dynamics.

**Supplementary Movie 11:** Live-cell two-color imaging of ER-lysosome interactions, including ER-mediated lysosome tubule fission, lysosome movement in ER matrix, lysosome tubule-directed lysosome moving,

and ER matrix dynamics.

**Supplementary Movie 12:** Live-cell imaging of mitochondrial and inner membrane dynamics. Scale bar, 1  $\mu\text{m}$ .

**Supplementary Movie 13:** Live-cell imaging of mitochondrial dynamics, including mitochondria-mediated mitochondrial fission (MMF), membrane connections between mitochondria, mitochondrial fusion and mitochondrial inner membrane dynamics.

**Supplementary Movie 14:** Live-cell two-color imaging of MMF (cyan) via the transport of Drp1 (red). Scale bar, 1  $\mu\text{m}$ .