

## SUPPLEMENTARY MOVIE LEGENDS

### **Movie 1: Unconfined microtubule polymerisation**

Time-lapse spinning disk microscopy movie of unconfined microtubule polymerisation in the presence of 20  $\mu\text{M}$  Atto633-labelled tubulin in Droplet Buffer without glycerol, triggered by a temperature shift to 32°C. Total time: 20 min. Scale bar: 20  $\mu\text{m}$ .

### **Movie 2: Confined microtubule polymerisation – end state**

Time-lapse spinning disk confocal microscopy movie of polymerising microtubules at the equatorial plane of DOPC/DOPE/DOPG-monolayered droplets containing 40  $\mu\text{M}$  Atto633-tubulin in Standard Droplet Buffer. Microtubules form a Spoke-Like Arrangement. The polymerisation reaction was triggered by a temperature shift to 32°C. Total time: 20 min. Scale bar: 20  $\mu\text{m}$ .

### **Movie 3: Time Course - Evenly Distributed**

Time-lapse spinning disk confocal microscopy movie of polymerising microtubules at the equatorial plane of DOPC/DOPE/DOPG-monolayered droplets containing 40  $\mu\text{M}$  Atto633-tubulin in Standard Droplet Buffer. Microtubules arranging Evenly Distributed throughout the droplet lumen. The polymerisation reaction was triggered by a temperature shift to 32 °C. Total time: 20 min. Scale bar: 20  $\mu\text{m}$ .

### **Movie 4: Time Course - Cortical Arrangement**

Time-lapse spinning disk confocal microscopy movie of polymerising microtubules at the equatorial plane of DOPC/DOPE/DOPG-monolayered droplets containing 40  $\mu\text{M}$  Atto633-tubulin in Standard Droplet Buffer. Microtubules arranging cortically. The polymerisation reaction was triggered by a temperature shift to 32 °C. Total time: 20 min. Scale bar: 20  $\mu\text{m}$ .

### **Movie 5: Time Course - Ring-Like Bundle**

Time-lapse spinning disk confocal microscopy movie of polymerising microtubules at the equatorial plane of DOPC/DOPE/DOPG-monolayered droplets containing 40  $\mu\text{M}$  Atto633-tubulin in Standard Droplet Buffer. Microtubules form a single Ring-Like Bundle. The polymerisation reaction was triggered by a temperature shift to 32 °C. Total time: 20 min. Scale bar: 20  $\mu\text{m}$ .

### **Movie 6: Time Course - Spoke-Like Arrangement**

Time-lapse spinning disk confocal microscopy movie of polymerising microtubules at the equatorial plane of DOPC/DOPE/DOPG-monolayered droplets containing 40  $\mu\text{M}$  Atto633-tubulin in Standard Droplet Buffer. Microtubules form a Spoke-Like Arrangement. The polymerisation reaction was triggered by a temperature shift to 32 °C. Total time: 20 min. Scale bar: 20  $\mu\text{m}$ .

### **Movie 7: Time Course - Opening Cloud**

Time-lapse spinning disk confocal microscopy movie of polymerising microtubules at the equatorial plane of DOPC/DOPE/DOPG-monolayered droplets containing 40  $\mu\text{M}$  Atto633-tubulin in Standard Droplet Buffer. Microtubules form an Opening Cloud arrangement. The polymerisation reaction was triggered by a temperature shift to 32 °C. Total time: 20 min. Scale bar: 20  $\mu\text{m}$ .

### **Movie 8: Unconfined motor/ microtubule self-organisation**

Time-lapse spinning disk confocal microscopy movie of unconfined motor-driven microtubule organisation in the presence of 7  $\mu\text{M}$  Atto633-tubulin (red) and 100 nM Cherry-kinesin-14 (green) in Standard Droplet Buffer. The reaction was triggered by a temperature shift to 32 °C. Total time: 20 min. Scale bar: 20  $\mu\text{m}$ .

**Movie 9: Confined motor/ microtubule self-organisation (Large Droplet)**

Time-lapse spinning disk confocal microscopy movie of motor-driven microtubule organisation imaged at the equatorial plane of a large DOPC/DOPE/DOPG-monolayered droplet (diameter circa 85  $\mu\text{m}$ ), containing 40  $\mu\text{M}$  Atto633-tubulin (red) and 200 nM Cherry-kinesin-14 (green) in Standard Droplet Buffer. The reaction was triggered by a temperature shift to 32  $^{\circ}\text{C}$ . Total time: 25 min. Scale bar: 20  $\mu\text{m}$ .

**Movie 10: Confined motor/ microtubule self-organisation (Medium Droplet)**

Time-lapse spinning disk confocal microscopy movie of motor-driven microtubule organisation imaged at the equatorial plane of a medium sized DOPC/DOPE/DOPG-monolayered droplet (diameter circa 30  $\mu\text{m}$ ), containing 40  $\mu\text{M}$  Atto633-tubulin (red) and 200 nM Cherry-kinesin-14 (green) in Standard Droplet Buffer. The reaction was triggered by a temperature shift to 32  $^{\circ}\text{C}$ . Total time: 25 min. Scale bar: 20  $\mu\text{m}$ .