

## Description of Additional Supplementary Files

### **Supplementary Movie 1**

**Description:** Epifluorescence microscopy video showing wetting and capture of an individual proteinosome labelled with FITC (green) by a single micelle coacervate droplet doped with Nile Red (red) and subsequent coalescence with a larger coacervate droplet. Movie is shown at real-time speed at 7 frames per second. Total duration of recording was 19 seconds in real time. Scale bar = 50  $\mu\text{m}$ .

### **Supplementary Movie 2**

**Description:** Optical microscopy video showing proteinosome guest-mediated disassembly of a host fatty acid coacervate droplet. Movie is shown at  $\times 100$  of real-time speed at 10 frames per second. Total duration of recording was 20 minutes in real time. Scale bar = 50  $\mu\text{m}$ .

### **Supplementary Movie 3**

**Description:** Confocal fluorescence (left panel) and corresponding optical microscopy (right panel) videos showing the formation of elongated fatty acid protrusions at the coacervate/water interface during proteinosome guest-mediated disassembly of a host coacervate droplet. The tubular vesicles transform into spherical vesicles either directly by self-assembly in the external solution, or indirectly via diffusion of free fatty acid molecules into the proteinosome interior. Movie is shown at  $\times 150$  of real-time speed at 5 frames per second. Total duration of recording was 20 minutes in real time. Scale bar = 50  $\mu\text{m}$ .

### **Supplementary Movie 4**

**Description:** Optical microscopy video showing self-induced capture of a urease/GOx-containing proteinosome via urease-mediated transformation of fatty acid vesicles into micelle coacervate droplets in the presence of urea (20 mM). The droplets gradually coalesce at the surface of the proteinosome to form a proteinosome-in-coacervate host-guest protocell. Movie is shown at  $\times 100$  of real-time speed at 10 frames per second. Total duration of recording was 24 minutes in real time. Scale bar = 50  $\mu\text{m}$ .