

## Description of Additional Supplementary Files

**Supplementary Movie 1.** Attempt to attach a water-immersed particle to the oil–water interface using optical laser tweezers. The particle was attached to the interface. The water phase contained 10 mM NaCl.

**Supplementary Movie 2.** Attempt to attach a water-immersed particle to the oil–water interface using optical laser tweezers. The particle was not attached to the interface. The water phase contained 10 mM NaCl.

**Supplementary Movie 3.** Attempt to form a  $P_1^i - P_2$  dimer using optical laser tweezers. The dimer was formed. The water phase contained 10 mM NaCl.

**Supplementary Movie 4.** Attempt to form a  $P_1^i - P_2$  dimer using optical laser tweezers. The dimer was not formed. The water phase contained 10 mM NaCl.

**Supplementary Movie 5.** Attempt to form a  $P_1^i - P_2 - P_3$  trimer using optical laser tweezers. The trimer was formed. The water phase contained 10 mM NaCl.

**Supplementary Movie 6.** Optical trap on  $P_2$  of the  $P_1^i - P_2 - P_3$  trimer was removed. The  $P_2$  position was maintained. The water phase contained 10 mM NaCl.

**Supplementary Movie 7.** Optical trap on  $P_3$  of the  $P_1^i - P_2 - P_3$  trimer was removed. The  $P_3$  position was maintained. The water phase contained 10 mM NaCl.

**Supplementary Movie 8.** Attempt to form a  $P_1 - P_2 - P_3$  trimer in water using optical laser tweezers. The trimer was not formed.  $P_2$  disappeared when the optical trap on  $P_2$  of the  $P_1 - P_2 - P_3$  trimer was removed. The water phase contained 10 mM NaCl.

**Supplementary Movie 9.** Formation of a heptamer. The water phase contained 10 mM NaCl.

**Supplementary Movie 10.** Bending micromechanics of a heptamer. The water phase contained 10 mM NaCl.

**Supplementary Movie 11.** Bending micromechanics of a pentamer. The water phase contained 10 mM NaCl.

**Supplementary Movie 12.** Formation of dimers in large-scale experiments. Pure water was used.