

**Supplementary Figure 1.** Molar mass of Spot14/Mig12 measured by size-exclusion chromatography with multiangle light scattering, quasi-elastic light scattering and refractive index detectors. Observed molar masses at the apex of peak are indicated. The theoretical molecular weight of Spot14/Mig12 heterodimer is 38.36 kDa.

**Supplementary Figure 2.** Particle analysis of atomic force microscopy images shown in Figure 3. Selected particles are shown in sky blue with threshold height for above direction at 6 nm, 5.7 nm, 5.7 nm and 4 nm for ACC2 alone, ACC2 + citrate, ACC2 + citrate + Spot14/Mig12  $\alpha\beta$ , ACC2 + citrate + Spot14/Mig12  $(\alpha\beta)_6$ , respectively. Some particles are not selected for analysis since non-representative particles whose area is less than the average area minus three sigma of that area are filtered out.

**Supplementary Figure 3.** Atomic force microscopy nanoscale imaging of Spot14/Mig12 hexa-heterocomplex with  $28 \pm 2$  nm in diameter and  $822 \pm 125$  nm<sup>2</sup> (n=51) in area. Height image of the AFM data is shown with a 2 nm color height scale.