# Multiscale Self-Assembly of Microtubes

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Mixtures of β-cyclodextrin (β-CD) and sodium dodecyl sulfate (SDS) form complexes in a 2:1 molar ratio at elevated temperatures [1]. Upon cooling to room temperature these SDS@2β-CD complexes self-assemble into hollow 'annular ring' microtubes. By adding colloidal particles into the mixture colloid-in-tube assemblies are obtained after a heating/cooling cycle [2]. Depending on the ratio of colloid-to-tube diameters various structures can be formed such as zigzag, zipper and helical sphere chains (see figure 1).
The self-assembly of this complex system was characterized by small-angle x-ray scattering at the ESRF, covering a total of three orders of magnitude of spatial scales. Furthermore, the response of this system to variations in temperature and concentration was probed.

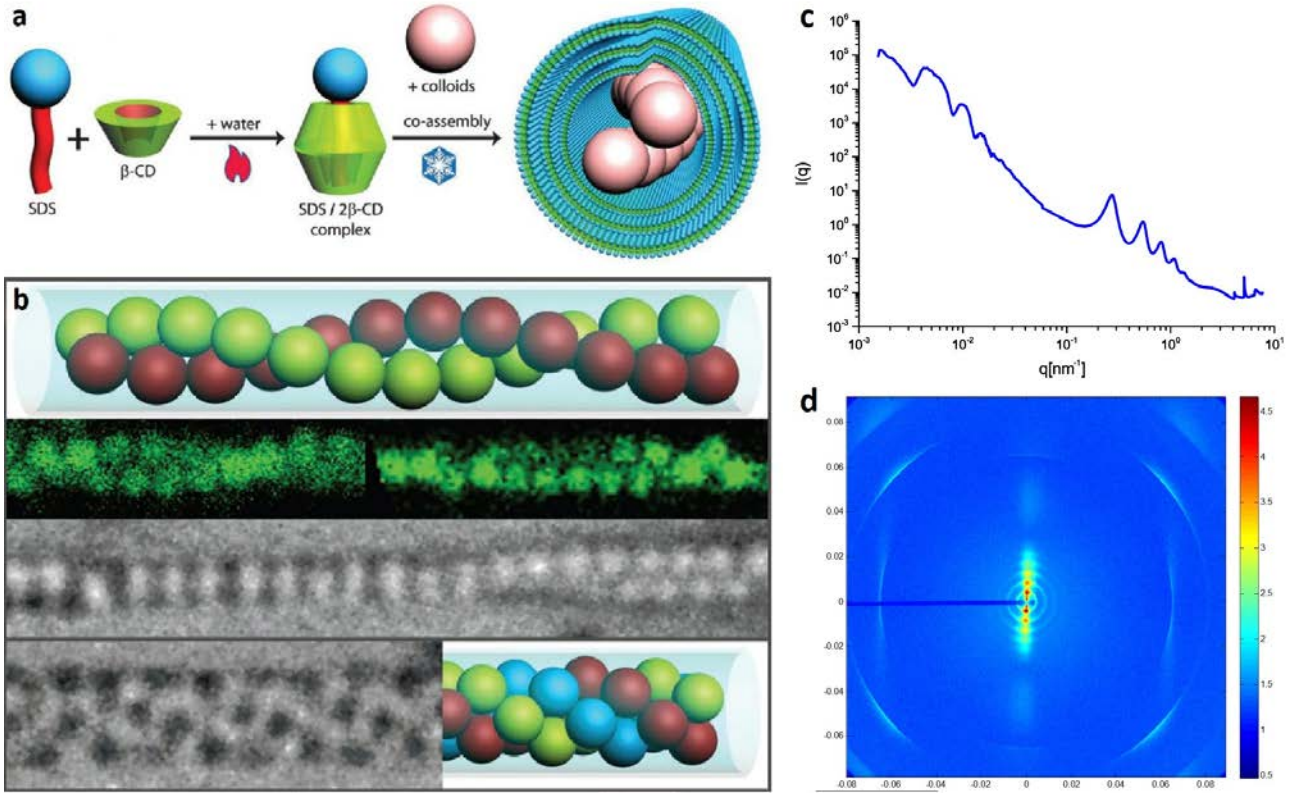


**Figure 1** (a) Co-assembly of SDS@2β-CD microtubes and colloids. (b) Helical structures are formed upon confining colloidal spheres in microtubes. (c) Radial intensity profile and (d) 2D SAXS pattern of microtubes.

[1] L. Jiang, Y. Peng, Y. Yan, M. Deng, Y. Wang and J. Huang, *Soft Matter*, 2010, **6**, 1731.
[2] L. Jiang, J.W.J. de Folter, J. Huang et al., *Angewandte Chemie Int. Ed., 2013*, **52**, 3364.