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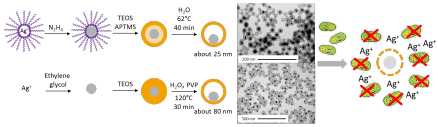

Figure 1. Synthesis and antimicrobial Ag^+ release of $Ag@SiO_2$ nanorattles: microemulsion method (top) and Stöber conditions followed by surface protected etching (bottom).

Keywords: nanocontainers, nanorattles, antimicrobial surfaces, silica, silver

MS38-P2 Dual-Responsive Lipid Nanotubes: Two-Way Morphology Control by pH and Redox Effects

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Lipid nanotubes are the preferred structures for many applications, especially biological ones. Here, we presented a two-way reversible morphology control of the nanotubes formed by the novel molecule AQUA ($C_{25}H_{29}NO_4$). The diameters of the AQUA nanotubes are 110±20 nm, and their lengths are 4-8 µm. AQUA has both pH-sensitive and redox-active characters provided by the carboxylic acid and anthraquinone groups. Upon chemical reduction, the nanotubes turned into thinner ribbons and this structural transformation was significantly reversible. Nanotube morphology can additionally be altered by decreasing the pH below the pKa value of the AQUA. The molecular length of AQUA is calculated as ~2 nm, and when this value is combined with the information gained from the XRD and cryo-TEM analysis such that the nanotubes have a multi-layered structure. The number of layers is either 2 or 3 and the total wall thickness is 4-6 nm at pH 9, this proves the claims that the d-spacing value of ~2 nm in the XRD spectrum gives the thickness of one layer in the tube walls and the wall structure is composed of symmetrical monolayers with a little space between them at pH 9. Decreasing the pH caused the gradual unfolding of the nanotubes and the inter-layer distance in the nanotube's walls increased. This morphological change is fast and reversible at a wide pH range (Fig.1).

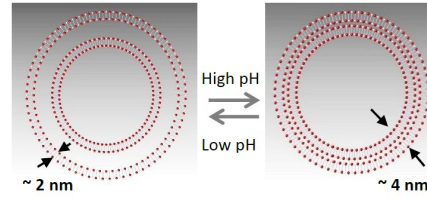

Figure 1. Schematic representation of the effect of pH on the membrane structure

Keywords: Lipid nanotube, Stimuli response, Redox-active, pH-sensitive, Conductive, XRD, TEM