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CROWN-APPENDED CHOLESTROL GELATORS AND TRANSCRIPTION OF THEIR SUPERSTRUCTURES TO SILICA GEL

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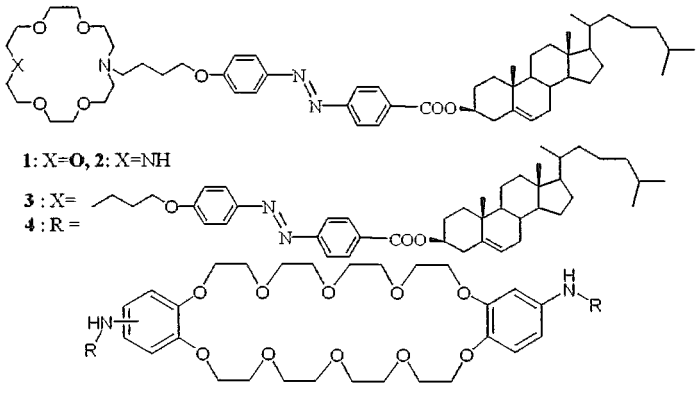
A diversity of supramolecular structures can be created, not only in nature but also in artificial systems, by self-assembly of designed "organic" building blocks. In contrast, creation of such diverse supramolecular structures from "inorganic" materials seems to be very difficult or nearly impossible. Is there any innovative method by which inorganic materials can be self-assembled into the ordered supramolecular structures? The sole method, if any, would be to create such tailor-made inorganic materials with the aid of a template effect of organic surfactant molecules. To obtain novel structure of the silica, we prepared four crown-appended cholesterol gelators **1-4**, and evaluated gelation ability in organic solvents. They acted as versatile gelators of organic fluids. The xerogels showed a lamellar structure for **1** and **2** whereas the xerogels bearing two cholesterol groups showed a muli-layered vesicular structure for **3** and the helical and the tubular structures for **4**. Sol-gel polymerization of tetraethoxysilane (TEOS) was carried out using organogels as templates to obtain novel structure of the silica in the presence of metal ions. After calcination, the silica prepared from **1** and **2** revealed hollow tubular structure with 200-500 nm inner diameters. On the other hand, the silica obtained from **3** and **4** bearing two cholesterol groups showed the multi-layered vesicular structure with 200 nm outer diameter and the helical ribbon structure with 1700-1800 nm pitch. These results indicate that the novel silica structures can be created by transcription of the various superstructures in organogels as templates through electrostatic interaction. More interestingly, there are many small (< 1.0 nm) and large particles (20-55 nm) on the silica wall obtained from **1** in the presence of $AgNO_3$, which are clearly seen to be deposited between the silica layers. Here, we will discuss the preparation of organogels superstructures and transcription of their superstructures to silica.



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