Structure and Phase Behaviour of The Mixtures of Self-Assembling Tapered Compounds with Viologen

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Supramolecular chemistry and molecular technology are among the most claimed fields of modern materials science. Attention of researchers is concentrated on fundamental principles of self-assembling, embracing molecular recognition of exo- and endoreceptors, as well as on the possibilities for manipulating the nanosystem structure by moderate changes of environment conditions and of outer fields of different nature (including geometrical confinement). Self-assembling is co-operative process, giving substantial benefits for manufacture rates. Moreover, it is a “bottom-up” process, in which molecules of particular compound form supramolecular aggregates to be used as building blocks of the macroscopic system. Thus, the use of self-assembly process allows for much more accurate manipulation by the material structure and for the design of neat, precise structures.

In this report we present the results of the structural studies of co-assembling of two different mesogen types: viologen-based molecules 1,10-dimethyl (4-pyridin-4-ylpyridinium) di- (MV²⁺), 1,10,100-[benzene-1,3,5-triyltris(methylene)]tris(4-pyridin-4-ylpyridinium) tri- (V³⁺), and 1,10,100-[benzene-1,3,5-triyltris(methylene)]tris[(methyl)4-pyridin-4-ylpyridinium] hexa- (MV⁶⁺) cationic halides were mixed with wedge shaped caesium 3,4,5-tris(dodecyloxy)benzene sulfonate (DOBS) to form ordered supramolecular systems. Temperature behaviour of such systems was studied.

Figure 1. Constituent elements of the studied co-assembling mixtures.

Functional application of supramolecular aggregates containing molecular blocks of viologen and DOBS together is possible in several areas. They are determined by a wide interval of working temperatures, ability to charge transfer, ionic conductivity, thermo – and photoelectrochromism as well. For instance, considered as electroactive termotropic liquid crystals, these systems could find their application in electrochromic displays.

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