

Mesomorphic behaviour of hybrid triphenylene-siloxane oligomers

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Substituted triphenylenes have been widely studied as discotic mesogens. They form primarily nematic and columnar mesophases¹ with potential applications as 1-D charge migration due to the π - π interactions between the aromatic cores², with the advantage that they can be easily processed. However, the lack of long-range order along the column, limits the charge-carrier mobility (10^{-3} - 10^{-1} cm² V⁻¹s⁻¹)³. To improve this property it is necessary to obtain macroscopically aligned and stable monodomains of these materials.

A multiblock molecular architecture design of the discotic mesogen could be used as strategy to minimize the intracolumnar stacking fluctuations. The microsegregation between the different chemical parts of the mesogen favours core-core interactions⁴. Other possibility is to introduce covalent bonds between mesogens (as in oligomers and polymers) to reduce the freedom degrees of the aromatic core.

In this context, we synthesized the triblock triphenylene-carbosiloxane monomer, dimer, trimer and linear main-chain polymer (fig. 1). The compounds were characterized by ¹H-NMR, MALDI-TOF and elemental analysis. The liquid crystalline properties were studied by polarized optical microscopy (POM), differential scanning calorimetry (DSC), and variable temperature X-ray diffraction (XRD). The thermal data show that there is a gradual increase in the clearing temperature as the molecular mass increases (76°C for the monomer against 106°C for the polymer), while there is only a very small increase in the melting temperature (from 43°C to 50°C *ca*).

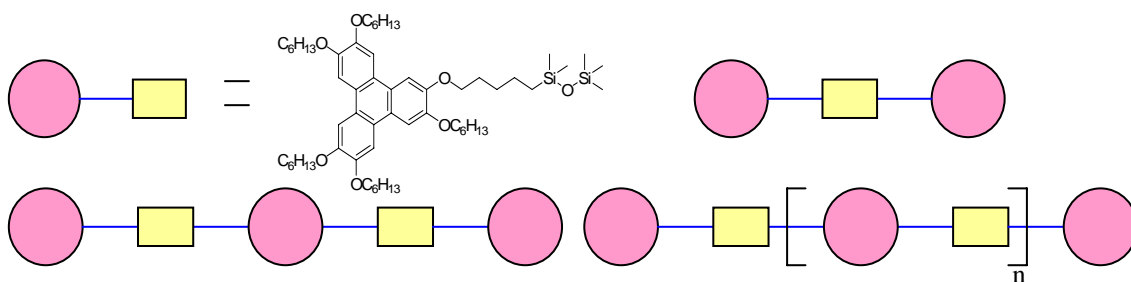


Figure 1: Schematic representation of the monomer, dimer, trimer and polymer synthesized.

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