

Mesomorphic properties of new [60]Fullerene-based polypedic hexakisadducts: influence of the regioselective multifunctionalization on the liquid-crystalline behaviour

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Combining an aesthetic structure with interesting electronic properties, C_{60} is a candidate of choice for the development of new materials and original ordered structures. However, the development of functional devices very often requires dedicated engineering of the molecules *i.e.* functionalization of the molecules for controlling their organization. Allowing the assembly of many mesomorphic units around C_{60} , hexaaddition is a method of choice to achieve the preparation of thermotropic [60]fullerene-based liquid-crystals [1] even starting from weak mesogenic promoters. Moreover, it is of interest to study the structure-LC properties relationships and to rationalize the influence of a precise orientation of the mesogens, obtained through regioselective grafting on the sphere, on the physical properties of the chromophore and also to correlate the liquid-crystalline behavior with the degree of addition on the carbon sphere. With this intention, we followed the methodologies based on 9,10-dimethylantracene (DMA)-templating for “all *e*” and “*trans-1*” hexaadditions on the [60]Fullerene developed by Hirsch and co-workers, recently improved and by B. Krautler and collaborators in order to prepare new C_{60} -based liquid-crystalline polypedes (Figure 1). Four novel polypedic hexakisadducts displaying different symmetries and bearing 12, 10 or 8 mesogenic units were prepared in 40 to 60% yield: all showed a “constrained nematic” self-organization (no literature equivalent) deduced from X-ray diffraction studies (Figure 2) and molecular modelling calculations.

[1] Hind Mamlouk, Benoit Heinrich, Cyril Bourgoigne, Bertrand Donnio, Daniel Guillon and Delphine Felder-Flesch, *Journal of Materials Chemistry*, **2007**, 17, 2199 – 2205.

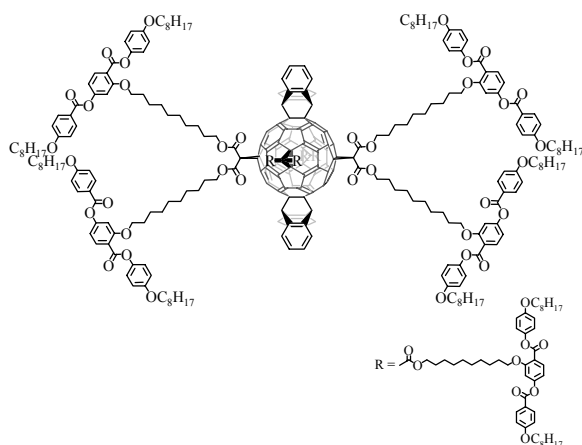


Figure 2: X-ray pattern recorded at 50°C for hexakisadduct [4:2]. Right: oriented pattern under magnetic field. Left: 2θ profile of oriented pattern.

Figure 1: Liquid-Crystalline polypedic [60]fullerene hexakisadduct [4:2].

