Fullerene based-dendrimers: molecular organization in mesophases and in LB films

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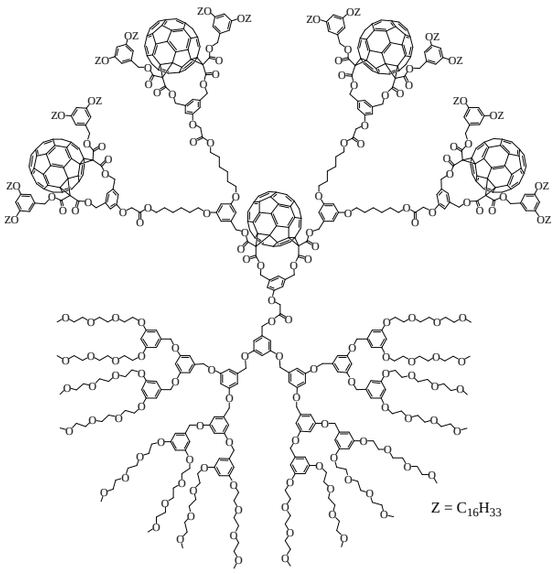
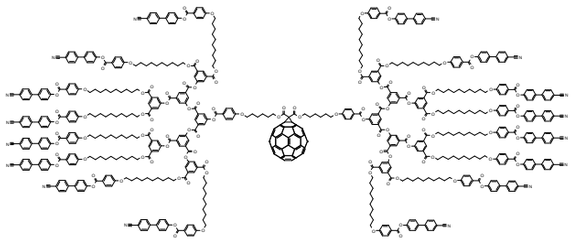
Growing attention is currently devoted to large dendritic structures for applications in nanotechnology and materials science. In this respect, the incorporation of such compounds into thin ordered films appears to be an important issue. One of the most widely pursued approaches to structurally ordered dendrimer assemblies has been the preparation of Langmuir films at the air-water interface. We report on the case of a diblock globular fullerene-based dendrimer and show that peripheral substitution of the dendrimer with hydrophobic chains on one hemisphere and hydrophilic groups on the other provides the required hydrophobic/hydrophilic balance allowing the formation of stable Langmuir films [1].



A second approach has been to consider the case of fullerene containing dendrimers terminated by mesogenic groups such as cyanobiphenyl subunits. Whatever the generation is, up to the fourth one, all these compounds exhibit a well defined liquid crystalline smectic A phase. The molecular organisation within the smectic layers is found to be monolayered or bilayered depending on the generation. For the smallest dendrimers, the organisation is mainly governed by the size of the fullerene moiety, whereas for the higher ones, it is governed by the interactions between the terminal mesogenic groups [2].



These two approaches appear particularly interesting for functional groups such as fullerenes which are not well adapted to be organised in nanoscale architectures. The present study shows that fullerenes can indeed be introduced into different types of ordered structure when they have been chemically adequately modified.

[1] J.F. Nierengarten, J.F. Eckert, Y. Rio, M. del Pilar Carreon, J.L. Gallani, D. Guillon, *J. Am. Chem. Soc.*, **2001**, *123*, 9743.
[2] B. Dardel, D. Guillon, B. Heinrich, R. Deschenaux, *J. Mater. Chem.*, **2001**, *11*, 2814.