

Fullerodendrimers with Peripheral Triethyleneglycol Chains: Synthesis, Photophysical Properties and Incorporation in Sol-Gel Glasses for Optical Limiting Applications

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The synthesis and the study of fullerene-functionalised dendrimers (fullerodendrimers) have attracted increasing attention in the past decade.¹⁻⁴ Dendrimers with a C₆₀ core,² peripheral C₆₀ subunits³ or a C₆₀ sphere at each branching unit⁴ have been described. As far as fullerodendrimers with a C₆₀ core are concerned, it should be noted that the functionalisation of the fullerene sphere with dendrons dramatically improves the solubility of the C₆₀. Furthermore, the encapsulation of the fullerene in the middle of a dendritic structure provides a compact insulating layer around the carbon sphere. This latest peculiarity has been exploited in the design of amphiphilic fullerene derivatives for efficient incorporation in Langmuir films⁵ or for the preparation of fullerene-containing liquid crystals.⁶ In both cases, the surrounding dendritic branches prevent unfavorable effects of the C₆₀ sphere such as aggregation or steric hindrance. As part of this research, we now report the synthesis of new fullerodendrimers by direct functionalisation of C₆₀ with water soluble poly(aryl ether) dendritic branches, their photophysical properties in a wide range of solvents and their incorporation in sol-gel glasses for optical limiting applications.

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References

- [1] For a review on fullerodendrimers, see: Nierengarten, J.-F.; *Chem. Eur. J.* 2000, 6, 3667-3670.
- [2] See for examples : Wooley, K. L.; Hawker, C. J.; Fréchet, J. M. J.; Wudl, F.; Srdanov, G.; Shi, S.; Li, C.; Kao, M.; *J. Am. Chem. Soc.* 1993, 115, 9836-9837; Camps, X.; Hirsch, A.; *J. Chem. Soc., Perkin Trans. 1* 1997, 1595-1596; Camps, X.; Schönberger, H.; Hirsch, A.; *Chem. Eur. J.* 1997, 3, 561-567; Nierengarten, J.-F.; Habicher, T.; Kessinger, R.; Cardullo, F.; Diederich, F.; Gramlich, V.; Gisselbrecht, J.-P.; Boudon, C.; Gross, M.; *Helv. Chim. Acta* 1997, 80, 2238-2276; Brettreich, M.; Hirsch, A.; *Tetrahedron Lett.* 1998, 39, 2731-2734; Avent, A. G.; Birkett, P. R.; Paolucci, F.; Roffia, S.; Taylor, R.; Wachter, N. K.; *J. Chem. Soc. Perkin 2* 2000, 1409-1414; Rio, Y.; Nicoud, J.-F.; Rehspringer, J.-L.; Nierengarten, J.-F.; *Tetrahedron Lett.* 2000, 41, 10207-10210.
- [3] Nierengarten, J.-F.; Felder, D.; Nicoud, J.-F.; *Tetrahedron Lett.* 1999, 40, 269-272; Nierengarten, J.-F.; Felder, D.; Nicoud, J.-F.; *Tetrahedron Lett.* 1999, 40, 273-276. Armaroli, N.; Boudon, C.; Felder, D.;

Gisselbrecht, J.-P.; Gross, M.; Marconi, G.; Nicoud, J.-F.; Nierengarten, J.-F.; Vicinelli, V.; *Angew. Chem. Int. Ed. Engl.* 1999, 38, 3730-3733.

[4] Nierengarten, J.-F.; Felder, D.; Nicoud, J.-F.; *Tetrahedron Lett.* 2000, 41, 41-44; Felder, D.; Nierengarten, H.; Gisselbrecht, J.-P.; Boudon, C.; Leize, E.; Nicoud, J.-F.; Gross, M.; Van Dorsselaer, A.; Nierengarten, J.-F.; *New J. Chem.* 2000, 24, 687-695.

[5] Cardullo, F.; Diederich, F.; Echegoyen, L.; Habicher, T.; Jayaraman, N.; Leblanc, R. M.; Stoddart, J. F.; Wang, S.; *Langmuir* 1998, 14, 1955-1959.

[6] Dardel, B.; Deschenaux, R.; Even, M.; Serrano, E.; *Macromolecules* 1999, 32, 5193-5198.

