

C₆₀ and C₇₀ in a Basket? - Investigations of Mono- and Multilayers from Azacrown Compounds and Fullerenes.

Ringsdorf, H. et al. *Angew. Chem. Int. Ed. Engl.* **1992**, *31*, 1599-1602.

UV-Topic: Aggregation study using UV/Vis

Chem Topic: Langmuir-Blodgett (LB) films

Mono- and multilayers of 1:1 mixtures of C₆₀ and C₇₀ fullerenes (**1**) and amphiphilic molecules (**2**) containing lipophilic cavities are reported. Molecules **3** and **4** serve as amphiphilic compounds.

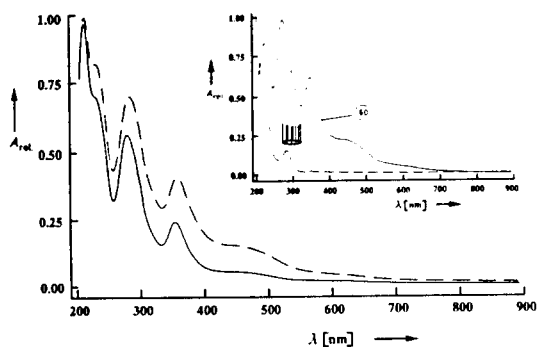
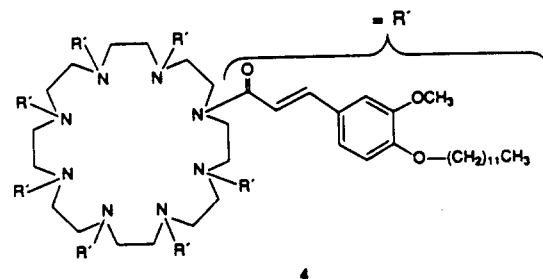
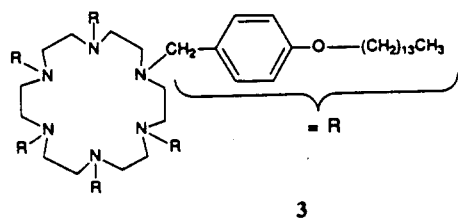


Fig. 3. Experimental and theoretical UV VIS spectra of an LB multilayer consisting of LB films of a 1:1 mixture of C₆₀ and **3** (2 × 17.5 bilayers). Solid line: recorded spectrum. Broken line: the spectrum obtained by addition of the spectra of films of pure **3** and C₆₀. The absorbance values are relative (A_{rel}), the highest peak is arbitrarily set to 1. The inset shows the UV VIS spectra of the films of pure **3** and C₆₀.

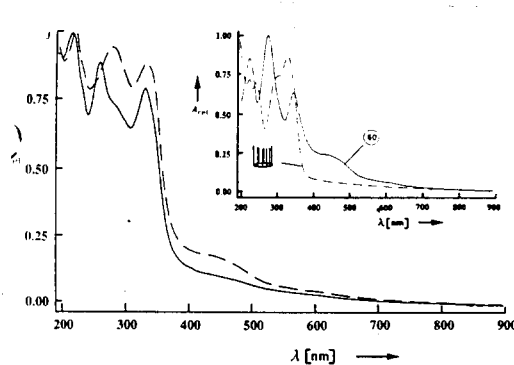


Fig. 4. Experimental and theoretical UV VIS spectra of a LB multilayer consisting of LB films of a 1:1 mixture of C₆₀ and **4** (2 × 12.5 bilayers). Solid line: recorded spectrum. Broken line: the spectrum obtained by addition of the spectra of films of pure **4** and C₆₀. The absorbance values are relative (A_{rel}), the highest peak is arbitrarily set to 1. The absorption at 256 nm is not present in the spectra of the pure compounds shown in the inset.

While neither **3** nor C₆₀ form LB films alone, their 1:1 mixture forms homogeneous LB multilayers with an average thickness of 47 Å. The incorporation of **3** and of the fullerene into the layer was confirmed by UV/Vis spectroscopy. Fig. 3 shows the absorption spectrum of the **3**/C₆₀ LB film and a calculated spectrum (addition of the spectra of the components). Similar results were obtained for **3**/C₇₀ LB and **4**/C₆₀ (Fig. 4) LB films. The microscopic environment of the fullerenes in the azacrown films seems to remain unchanged if more layers are added, as shown by the linear relationship between the number of layers and the absorption maxima of the peaks in the UV/Vis spectra. The authors suggest a “C₆₀ in a basket” structure for the films based on the stoichiometry (UV/Vis), Atomic Force Microscopy (AFM), and SAXS measurements.