Poster

Photoresponsive Amphiphiles Based on Azobenzene Glycerol Conjugates for Drug Delivery

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The photoisomerisation of azobenzenes has shown great practicality[1]. The thermodynamically favoured *trans* isomer can be switched to the *cis* isomer within minutes by light (~360 nm). Back switching to the *trans* isomer can be achieved either by heat or by light (~450 nm). This photoswitching is used for controlling the expression of genes or the function of proteins[2] as well as in liquid crystals.[3] Making use of the large change in geometry, we are interested in changing the properties of an amphiphile consisting of a dendritic polyglcerol head and a hydrocarbon tail. The micelles are able to incorporate guests, like drugs or dyes, into the hydrophobic core.

In this work, photoresponsive amphiphiles, whose hydrophobic and hydrophilic part is separated by an azobenzene, are examined.

The azobenzene switch bears an aliphatic chain on one side and on the other side a polyglycerol (PG) dendron (Figure 1). The length of the chain is varied from C11 to C16 as well as the size of the generation of the PG dendron (generation 2 and 3). After photoisomerization from *trans* to *cis* the critical micelle concentration (cmc) is increased. First results for G2azoC11 show a doubled cmc after switching (Figure 2). In the all-*trans* state the cmc is 4E-5 mol/l, whereas after the light-induced switching the cmc is 8E-5 mol/l. The steric demand of one molecule at the air-water interface also increased from 0.25 nm^2 to 0.33 nm^2. We observe a ten-fold increase in cmc upon switching by increasing the PG generation to G3. For the unswitched all-trans state the cmc is 7.7 E-6 mol/l, whereas after isomerization the cmc increased to 6E-5 mol/l. The steric demand for one molecule at the air-water interface now changes from 0.7 nm^2 to 1 nm^2. The lower cmc for the G3 compared to the G2 compound is expected due to the growth of the hydrophilic part.

References:

[1] A. Teitel, *Naturwissenschaften*, **44**, (1957) 370.

[2] A. Yamazawa, X. Liang, H. Asanuma, M. Komiyama, *Angew. Chem. Int. Ed.* **39,** (2000) 2356.

[3] A. Natansohn, P. Rochon, *Chem. Rev.*, **102**, (2002) 4139–4175.

Figures

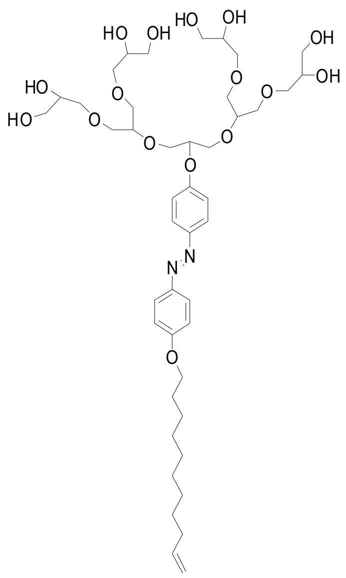

Figure 1: G2azoC11

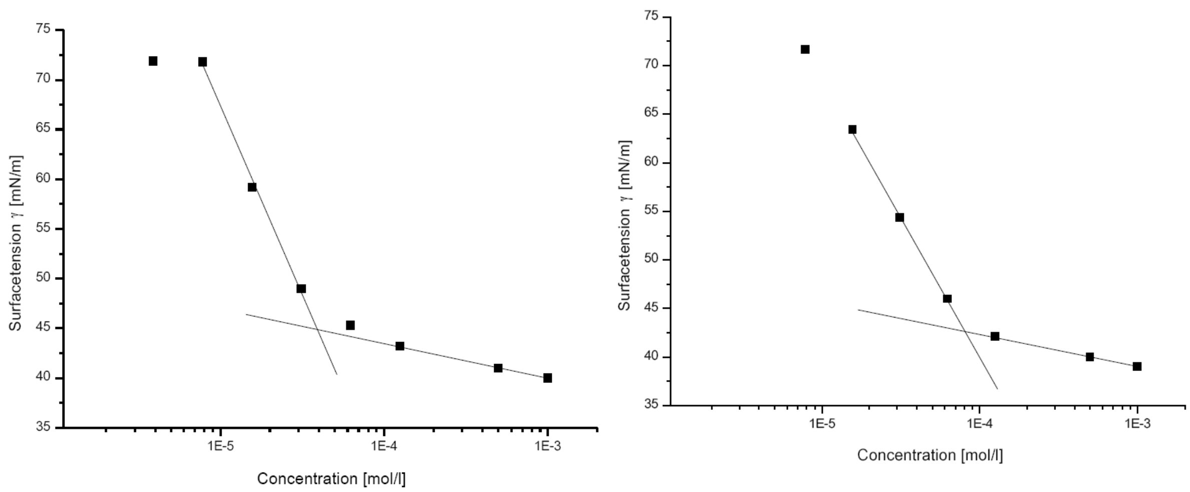

Figure 2: *left*: cmc measurement for *trans* G2azoC11, cmc = 3.9E-5 mol/l; *right*: cmc measurement after irradiation with 350 nm for 12 h, cmc = 8.0E-5 mol/l.