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COMPLEX SUPRAMOLECULAR AZO-POLYSILOXANE SYSTEMS WITH POTENTIAL BIOLOGICAL APPLICATIONS

I. Moleavin, L. Epure, R. Enea, N. Hurduc

Department of Natural and Synthetic Polymers, Technical University of Iasi, Mangeron Av. 71, 700050, Iasi, Romania

Here, we report the possibility to obtain azo-polysiloxanes able to generate different supramolecular associations by interacting with biomolecules. Two types of systems were investigated: photosensitive micelles and films.

The photosensitive micelles contain azobenzenic groups that are able to induce the aggregation/disaggregation of the micelles under UV irradiation [1-2]. The capacity of the amphiphilic azo-polysiloxanes to aggregate in aqueous solution was evaluated. The polymers were synthesized starting from a polysiloxane containing chlorobenzyl groups in the side-chain, by a two step reaction. In the first step, the polysiloxane was substituted (40-50%) with azobenzene, in the second one, the unreacted chlorobenzyl groups was quaternized with different tertiary amines.

The aggregation capacity of the azo-polysiloxanes was investigated using the classical method based on pyrene fluorescence spectroscopy. The critical aggregation concentration values are situated between 2 x 10^{-3} g/L and 10^{-2} g/L. These relatively low values can be explained by the presence of the azobenzenic groups that have a high aggregation tendency (H-type or J-type).

In order to obtain information concerning the geometry of the polymeric chains corresponding to the *cis*- or *trans*-azobenzene configuration, molecular simulations were performed using Accelrys [3] software (Materials Studio 4.0). The model of the polymeric chain conformation was obtained using a Molecular Mechanic procedure: Forcite module.

Preliminary studies concerning the immobilisation capacity of DNA molecules on the azo-polymeric film surface were performed. For this aim azo-polysiloxanes modified with nucleobases (adenine, thymine) were used.

[1] Wang G, Tong X, Zhao Y (2004) Preparation of azobenzene-containing amphiphilic diblock copolymers for light-responsive micellar aggregates. Macromolecules 37: 8911-8917

[2] Jiang J, Tong X, Morris D, Zhao Y (2006) Toward photocontrolled release using light-dissociable bloc copolymer micelles. Macromolecules 39: 4633-4640

[3] Materials Studio 4.0., Accelrys Software, Inc., San Diego (licensed to Nicolae Hurduc)