



## LANGMUIR AND LANGMUIR-BLODGETT (LB) FILMS OF HYDROPHOBIC AZOPOLYMERS

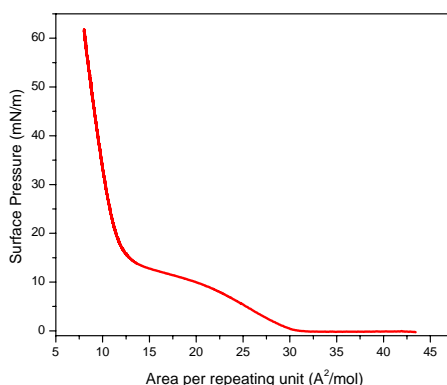
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**Abstract** – Azopolymers contain azobenzene groups whose optical properties have been exploited extensively in the literature, owing to the photoisomerization that is useful for the fabrication of surface-relief gratings and design of devices based on photoinduced birefringence. In this work, hydrophobic azopolymers were produced through copolymerization of an azomonomer and a hydrophobic methacrylic monomer, which were then studied in the form of Langmuir, Langmuir-Blodgett (LB) and cast films. The aim is to combine the optical properties with superhydrophobic self-cleaning surfaces.

The azobenzene groups in azopolymers may be located either in the side-chain or in the main-chain of the polymeric backbone. Upon exploiting the photoisomerization property of the azobenzene groups it is possible to photoinduce orientation of the molecules in solid samples, thus leading to phenomena such as birefringence, second-harmonic generation and electro-optical effect. These can be used in applications including optical storage and surface-relief gratings [1, 2], and frequency duplicators [3, 4]. With the aim of producing azopolymers with superhydrophobic surfaces for optical devices, in this work we synthesized copolymers from an azobenzene and a hydrophobic methacrylic monomers. The possible orientation of the hydrophobic chains was exploited by using the Langmuir-Blodgett (LB) technique to build up solid films. The azopolymers were synthesized by conventional radical polymerization, using the monomers 2,2,2 – Trifluoroethyl methacrylate (TFE-MA) and Disperse Red 13 methacrylate (DR13-MA) in the proportions of 10, 20, 30 and 50 wt% of DR13-MA. The polymers were characterized in relation to their chemical composition through UV-Vis., FTIR and  $^1\text{H}$ -RMN spectroscopies. The azomonomer was incorporated to the polymeric chain without degradation. Langmuir films were produced in a KSV5000 LB trough by spreading chloroform solutions of the polymer on an ultra-pure water subphase. The isotherms of surface pressure vs area per repeating unit displayed an interesting feature, characteristic of a phase transition during compression, as shown in Figure 1. The Langmuir films were found to be rather stable, at various surface pressures, at values below 10 mN/m, between 10 and 15 mN/m and above 15 mN/m. This allowed the films to be transferred onto solid substrates as Langmuir-Blodgett (LB) films.



**Figure 1:** Isotherm of surface pressure vs area by molecule of polymer with 20wt% of DR13-MA

### References

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