Poster

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Dynamics and relaxation in new fluorinated side chain polymers: an ESR investigation

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Fluorinated azobenzene liquid crystalline polymers appear promising materials as optical data storage substrates, especially in holographic recording, for their ability of suppressing surface relief (1). Their applicative importance also arises from the excellent water repellency (2) and the possibility of modulating wettability by the change in the dipole moment of the cis-trans photochromic species (3). The comprehension of the mechanism by which the internal structure and molecular architecture of these materials affect their microscopic relaxation phenomena will address an ever improved design for technological applications and a fundamental understanding, enlightening the presence of cooperative mechanisms or/and dynamic heterogeneity.

A new series of fluorinated homopolymers and random copolymers were investigated. They share the same main chain, and differentiate from a previous series (4, 5) for the substitution of the $-(CH_2)_4CH_3$ group with the $-CF_3$ one in the terminal part of the azobenzene-containing side chain.

The study was carried out by electron spin resonance to investigate the dynamics and matrix heterogeneity of the new series of copolymers, also in comparison with the previous non-fluorinated series. The structural relaxation of the polymers was also investigated by rheological measurements.

Different molecular architectures result in modulation of the relaxation properties at nanoscale level. Dynamics and matrix heterogeneity is discussed, highlighting how the different molecular architecture affects different dynamic responses and matrix heterogeneity over different length and time scales. Information on cooperativity of the dynamics is also provided.

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