

Synthesis and characterization of a series of methacrylic monomers and side-chain azopolymers

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In recent years azopolymers have been the subject of intense research because of their potential technological applications like optical information storage, photonic devices, among others. Such applications are closely related to the capability of the azobenzene unit for being *trans-cis* photoisomerized.¹ A second interesting property of these compounds emerges from its rod-like geometry, which induces the development of liquid crystal phases.² We have found that among the azopolymers that have attracted great interest are the side-chain liquid-crystalline polymers (SCLCP) grafted with azobenzene moieties, which combine photoinduced optical and liquid crystal properties, suitable for applications in photonics.³ As it is known, in a SCLCP the mesomorphic behavior depends on the spacer length, which provides mobility to the mesogen and affects properties like T_g and induced anisotropy stability. In this work we have synthesized and studied the thermotropic behavior of new methacrylic monomers and their corresponding side chain polymers containing phenyl-n-alkyloxy-substituted azobenzene mesogens, which are grafted to the polymer chain through an alkyloxy spacer of different length (6 and 10 methylenes). Polymerizations were carried out via free radicals using AIBN as initiator. Chemical structures of methacrylic monomers and polymers were characterized by ¹H NMR. The thermotropic behavior was studied by DSC and POM, and the thermal stability was determined by TGA. Results indicated a high thermal stability in all azopolymers with decomposition temperatures around 290°C. Both monomers and polymers developed a well-defined rich thermotropism in a wide temperature range, which was attested by the multiple thermal transitions and different optical textures. Monomers exhibited *Schlieren* textures whereas azopolymers developed *focal-conic fan* textures, typical for nematic and smectic phases, respectively.

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