Study of influence the stretching on the molecular dynamics in polypropylene fibres by NMR spectroscopy

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Set of stretched isotactic polypropylene fibres prepared with draw ratio lambda=4 at four different stretching temperatures has been investigated by 1H pulsed relaxation NMR methods and CW NMR spectroscopy. Some information on the influence of these conditions was obtained from CW NMR measurements by means of the temperature dependences of the second moment M2 and decomposition of the NMR spectra into elementary components corresponding to the chain with different mobility. The spin-lattice relaxation times in laboratory (T1) and rotating (T1r) frames were measured on the set of fibres. The minima of the temperature dependences of the observed relaxation times reflect the alpha-relaxation process in crystalline regions and beta-relaxation process related the double glass transition in non-crystalline regions of the studied fibres. An analysis of the experimental data shows that the stretching of the fibres at different temperature results in change of molecular mobility.