

**MORPHOLOGICAL CHANGES IN
ISOTACTIC POLYPROPYLENE
EVALUATED BY SAXS ANALYSIS: A
COMPARISON BETWEEN POLYMER
SAMPLES OBTAINED BY DIFFERENT
ZIEGLER-NATTA CATALYSTS.**

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The morphologic and structural behaviour of isotactic polypropylene (i-PP) has been studied by a number of authors, as well as in our lab since more than thirty years [1] (the references reported in [1] include also the most of our previous papers). A remarkable feature of i-PP is its transition from the quenched form to the well-crystallized one by annealing; the quenched form has been obtained by a rapid cooling of the molten polymer in a mixture of dry ice and acetone (-78°C); the annealing of the quenched and cold-stretched samples (fibers) has been carried out isometrically, at different temperatures till 155°C. The morphology of the quenched (mesomorphic) form as well as of the annealed samples has been studied through the analysis of the respective SAXS patterns; the SAXS patterns showed, for all the samples, a meridional interference peak, indicating a coherent macroreticular sequence in the fiber axis direction; the analysis of the meridional spots was performed two-dimensionally, according to the paracrystal theory. The equatorial intensity profiles are continuous-like and have been analyzed by Guinier-Warren approximation.

Three kinds of i-PP have been studied and compared, obtained by different Ziegler-Natta catalysts: first-generation catalyst, high-yield heterogeneous MgCl₂ supported catalyst and Zr-cene based catalyst, respectively.

Meaningful results come from SAXS analysis: the mesomorphic form of i-PP represents an interesting case of an apparently amorphous-like state; the annealing treatment allowed us to follow the reorganization of the amorphous-like state with increasing temperature; the number of morphologic parameters determined, both in the quenched samples and over the transition, allowed us to put in evidence differences in the behaviour of the samples.

[1] E. Ferracini, R. Goergl, V. Malta, A. Mazzavillani and B. Moretti "SAXS ANALYSIS OF THE TRANSITION INDUCED BY ANNEALING QUENCHED ISOTACTIC POLYPROPYLENE", J. MACROMOL. SCI.-PHYSICS, B40(6), 1193-1216 (2001).

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