

**Experiment title:**

A study on the influence of pressure on phase transitions in polyolefins probed by simultaneous in-situ X-ray diffraction.

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SC-358

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Report:

Here we report some of the preliminary findings on the isotactic and syndiotactic polypropylene during melting and crystallization process at fixed pressure. Figure 1 shows melting of the syndiotactic polypropylene at fixed pressure 3.2kbar. Here starting material was a melt crystallized polymer, at the atmospheric pressure, having combination of phases I, II and III. Figure 2 shows that on crystallization of thus melted material, at the isobaric pressure 3.2kbar, crystallization initially starts in phase II, which on cooling further transforms into phase I, and at the end at the room temperature pure phase I is obtained. From here it appears that around 3kbar at room temperature, Phase I is the stablest phase, while at the higher temperatures phase II is kinetically (and thermodynamically (?)) favorable phase. Further investigations need to be performed, to determine the stability regime for different phases in the pressure-temperature phase diagram.

Figure 3 shows preliminary results on the unusual melting behavior of pressure crystallized γ -phase of isotactic polypropylene. It seems that at lower pressures, (like 1 kbar in this case) γ -phase melts via the α -phase. Further, detailed studies have to be performed at different pressure regions and the crystallization kinetics of the γ - phase need to be followed.

