**Objectives**

- Dispersion of carbon nanotubes (CNT) in polyamide 6 (PA6) by melt mixing in a twin screw extruder, and preparation of nanocomposite microparts by microinjection moulding (µIM);
- Analysis of the CNT dispersion (using as received and functionalized CNT) in the PA6 matrix after extrusion and after µIM [1].
- Analysis of the PA6 morphology induced by the processing method and by mixing the CNT [2].

**Methods and techniques**

Nano-composites samples with 5 µm thickness were cut with along the flow direction of the extruded samples and in the central region of the µP and observed by optical microscopy. Samples were cryo-fractured and analysed by SEM. (fig. 1)

The morphology of the extruded and µIM samples was analyzed by differential scanning calorimetry (DSC) and by wide angle X-ray diffraction (WAXD). DSC was performed under N₂ (g) flow at heating rate of 10 °C min⁻¹. Diffraction patterns were acquired for extruded and µIM samples, across the specimen thickness and across its inner region (after removing a surface layer with approximately 50 µm thickness).

**Results**

- Extruded and µIM nanocomposites show good CNT dispersion, although overall the µIM samples present smaller CNT agglomerates compared to extruded composites. The SEM micrographs showed that f-CNT present better adhesion to PA6 (fig. 1).

- DSC analysis showed that µIM samples with low CNT content presented a secondary crystallization process at a temperature just below the onset of the melting peak, which was not observed for the extruded materials and for the µIM composites with high CNT content (fig. 2).

- WAXD results show that skin region of the PA6 µIM contains mostly γ crystalline form and the PA6 extruded material and all composites presented a larger contribution of the α form (fig. 3 and 4). The overall crystallinity was considerably higher for the extruded materials than µIM, and the main contribution to this difference was the larger amount of α phase crystallinity. Molecular orientation was observed only for µIM samples (fig. 3).

**Publications**