

## Modeling Shear-Induced Crystallization in Startup Flow: The Case of Segmented Copolymers

Matthias Nébouy,\* André de Almeida,\* Laurent Chazeau,\* and Guilhem Baeza\*

\* Univ Lyon, INSA-Lyon, CNRS, MATEIS, UMR 5510, F-69621 Villeurbanne, France

Thermoplastic elastomers are widely used in the industry since the 1960s for their rubbery properties and ease of processing. They can be found in dashboard elements, wires sheaths and bitumen modifiers. Among them, PBT/PTHF segmented block copolymers occupy an important place because of their versatile mechanical behavior, chemical resistance and thermal stability. These materials, made of phase separated hard- and soft- domains, can exhibit quite different morphologies according to their chemical composition and processing route.

Furthermore, the kinetics of crystallization of these materials in quiescent conditions has been recently studied by combining both differential scanning calorimetry and rheology measurements (time sweeps in isothermal and linear conditions). It has been shown that the hard-segments crystallization, consisting in a 2-steps process, is strongly impacted by the chain rigidity. In the present work, we propose to investigate the impact of a non-linear mechanical solicitation on the crystallization kinetics. Startup flow experiments were performed in the crystallization window (between  $T_m$  and  $T_c$ ) at different shear rates, following the evolution of the transient viscosity with time. The Doi-Edwards model is then extended to predict the viscosity divergence by accounting for the slowdown of the amorphous phase dynamics due to the shear-induced crystallization.