SL 6.15

Rheological Behavior of Crystallizing iPP

G. Lamberti (a), G.W.M. Peters (b) and G. Titomanlio (a)
(a) Department of Chemical and Food Engineering, University of Salerno, I-84084 Fisciano (SA), Italy
(b) Department of Mechanical Engineering, Technical University of Eindhoven, NL-5600 MB Eindhoven, The Netherlands

Crystallization of polymer melts, taking place during processing, can have a great impact on the processing, mainly because it can cause a large increase in the viscosity. Therefore, knowledge of the crystallization kinetics as a function of the thermo-mechanical history experienced by the polymer and the relation of the rheological behavior to the crystalline state is of importance for the modeling of the process.
In this work we carried out isothermal crystallization experiments, using DSC and rotational stress controlled rheometry. The time evolution of the relative crystallinity and the normalized complex viscosity evolutions are correlated by a novel technique which allows the simultaneous analysis of several runs, even if they are not carried out at same temperatures, which is the main requirement of traditional techniques. This new approach is adopted to obtain an experimental relationship between the crystallinity and the dynamic viscosity. An empirical model, able to correlate the experimental data, has been proposed and fitted to the data.