SL 9.36

Rheology of Highly-Filled Polyolefin/Wood Flour Composites

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Dynamic viscoelastic properties of highly filled metallocene polypropylene (mPP)/wood flour composites (30-60%) have been studied by a parallel plate rheometer at 180°C and 190°C testing temperatures. The dynamic rheological behavior of 60% filled polymer systems is characterized by solid-like response as inferred by the storage modulus – frequency relationship at 180°C. At higher temperature, the complex viscosity and storage modulus decrease and exhibit a Newtonian plateau in the low frequency region.
The 60% filled material showed a very clear peak in the loss modulus G″-dynamic strain curve at both temperatures. This is mostly thought to be due to strain-induced filler agglomeration at high loadings. It was also found that the rheological properties of the investigated composites depended on the gap between rheometer plates under certain conditions.
In order to obtain information about wall slip in highly filled mPP/wood flour composites, wall slip velocity measurements were also conducted by using a capillary rheometer according to Mooney's technique.