

Time dependent rheological properties of polypropylene nanocomposites

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Layered silicates as nanoscale fillers have a great potential in improving polymer material properties. Depending on the composite structure (agglomerated, intercalated or exfoliated) a significantly higher level of reinforcement can be achieved with a very small amount of filler. Rheological properties of polypropylene nanocomposites have been intensively studied over the years using for example rotational, capillary or extensional rheometry. Meanwhile the principle of reinforcement is known as the formation of a 3D network of single layers in the polymer matrix. But there is still a lack of knowledge about the time dependency of the exfoliation and stability of the physical network respectively. There are no studies on the time-dependent behaviour of the layered structure in polymer matrix. As most of the nanocomposite applications have more or less a long-term shelf life, this investigation is of major interest. In this study, the rheological properties of different polypropylene nanocomposites were measured immediately after processing. To evaluate the structural stability, the same samples were measured after defined period in constant storage conditions to see the changes in material properties. The used characterization equipments were cone-plate, high-pressure-capillary and extensional rheometer.