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COATING AND FUNCTIONALIZATION OF MONTMORILLONITE NANOPARTICLES FOR IMPROVED POLYMER PROCESSING

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In recent years the specific modification of nanocomposite fillers has gained an increasing interest. Layered silicates like montmorillonite count to the most used nanofillers. With the use of such fillers problems arise in polymer processing based on the different polarities of filler and polymer matrix. In this work the influence of surface and interlayer modified nanoclay on various material properties of polypropylene as well as its processing conditions is investigated. The key aspects of this work are to facilitate and optimize the exfoliation of the nanoclay and to improve the compatibility between the polymer matrix and the filler. This compatibility is of the utmost importance to achieve easy compounding and a homogenous distribution of the filler particles in the polymer. In order to achieve those properties the polar surfaces of the different montmorillonite types are coated and the interlayer ions are exchanged with organophilic cations. In addition to the hydrophobization the long chained cations have a beneficial effect on the exfoliation of the nanoclay. Due to that, a decrease of the scale of the nano particles can be achieved. The modified nanoclay is characterized with various methods. The amount of effectively applied coating material is determined with IR-Spectroscopy and thermogravimetric analysis (TGA) and the degree of the exfoliation as well as the scale of the particles is investigated with Scanning electron microscopy (SEM) and transmission electron microscopy (TEM) measurements. Furthermore polypropylene is processed with the modified nanoclay and tensile tests as well as rheological measurements are performed to determine a change in material properties.