



PROCESS STRUCTURING OF POLYMER NANOCOMPOSITES

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When compounding nanocomposites, the processing challenge is in getting the best dispersive mixing possible to intercalate and exfoliate the nanoadditives in the polymer matrix. PP-clay and PET-clay composites, prepared in novel minimixer and in a twin screw extruder, were submitted to a further stage of high stress biaxial elongation performed in the solid phase (emulating industrial processes). The PP nanocomposites were biaxially stretched at 153°C as near solid, so that the stresses are almost 3D and large enough to induce intercalation and exfoliation. This additional dispersive mixing is evaluated through rheology, XRD and microscopy (optical, TEM, SEM) of the melted samples at 190°C, i.e. the memory of the polymer orientation is removed and only the effect of biaxially stretching on intercalation and exfoliation is being measured. Initial results show that above a certain threshold of clay addition, a drastic change in rheology is observed with G' jumping by a factor of 10 to 100 when a biaxial stretching stage at draw ratio 4:1 is added to the mini-mixing stage (this stage increases G' of the nanocomposite x10 in comparison with G' of PP alone). Similar experiments on PET-clay nanocomposites will also be reported.