SPONTANEOUS EXFOLIATION AND SELF-ASSEMBLY PHENOMENA IN POLYVINYL PYRROLIDONE/SYNTHETIC LAYERED SILICATE NANOCOMPOSITES

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Polyvinylpyrrolidone (PVP) and synthetic montmorillonite (MMT) were used to prepare nanocomposites via the solution intercalation method using water as a solvent. The structural properties of the PVP/MMT nanocomposites were investigated by using wide- and small-angle X-ray scattering (WAXS and SAXS) as well as transmission electron microscopy. The research revealed that at concentrations not exceeding 20 wt.% MMT exfoliates without a necessity of any mechanical treatment. The orientation process needs no external force like shearing or stretching. Orientational structure was investigated by 2D WAXS and 2D SAXS methods. Analysis of diffractograms recorded for samples oriented with edges to the primary beam revealed that silicates platelets were aligned parallel to the surface of polymer film (Fig. 1). From TEM images it can be concluded that nanocomposites of PVP/MMT with 5 wt.% of MMT are exfoliated and distance between montmorillonite platelets average 32 nm (Fig. 2).

References