NANOCOMPOSITES OF POLY(VINYL CHLORIDE) WITH CARBON NANOTUBES (CNT)

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A relative low number of papers describing the composites of hard or plasticized poly(vinyl chloride) (PVC) with montmorylonite may be found in the literature [1-7]. Usually, the composites were prepared by the addition of the nano – additives into the PVC solution in tetrahydrofuran (THF), followed by the solvent vaporisation [1-5]. Another procedure described [6-7] was the *in situ* polymerization of PVC in the presence of montmorylonite. Up to now any paper presenting the nanocomposites of PVC with carbon nanotubes (CNT) was found. This is the research subject actually realized in a collaboration between the ATR in Bydgoszcz and the TUHH in Hamburg.

Composites of PVC with a single wall carbon nanotube (SWCNT) content between 0,25 to 1 wt. %, and with a multi wall carbon nanotube (MWCNT), content between 2.5 and 5 wt.%, were prepared in form of thin films casted from PVC solution in THF. In our experiments the following composition of the PVC solution was used: THF – 98,30 phr, PVC S61 (Anwil SA, Wloclawek Poland) 1,65 phr, and stabilizer MOK 17 (Acros) – 0,05phr.

After vacuum drying the casted films of PVC with CNT, were compressed moulded at a temperature of 175^{o}C. Following measurements were realized: SEM and TEM observation, DSC measurements and the determination of sorption, and of electrical and mechanical properties.

Depending on the nanocomposites composition, domains of a high homogeneity of CNT distribution, as agglomerates were found. The electrical conductivity depends significantly on the CNT concentration. The sorption and mechanical properties are modified only to a low extend. On the contrary, no influence of the CNT addition on the crystalline structure of PVC, as determined by DSC, was observed.

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SPECIFIC PROPERTIES AND ECOLOGICAL ASPECTS OF HIGHLY FILLED POLYMER COMPOSITES

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The highly filled polymer composites (HFPC) belongs nowadays to interesting alternative materials in many field of prospective application. Its main advantage is that sufficiently high-quality properties may be achieved, even if a significant part of the polymer is replaced by any commercial available and economically interested fillers. Thus construction composite materials based on polymeric matrix may be produced and applied in several industrial branches.

The idea of creating such materials is well known since years, but the growing scientific interest in the last decade, provoked a significant improvement in the structural, processing and application description of these materials.

To the most popular, but still not fully described HFPC belong the so called WPC (wood polymer composites) and composites of polyolefins with a high content of calcium carbonate. Because 40 to 60 wt. % of the polymer is replaced in this case by environmentally friendly fillers, thus such composite may be called ecological construction materials.

The task of this work is to investigate the specific way of homogenization of such composite materials by means of typical processing