

## **Oponent Review of the Doctoral Thesis of Ing. Tomáš Peprníček: “Inorganic Filler in Polymer Environment”**

The Doctoral Thesis of Ing. Tomáš Peprníček was submitted as a collection of four papers from which the first one was already published in the journal Polym. Degr. and Stability, and the second one was accepted for publication in the same journal. The third paper was accepted for publication in Int. J. Polym. Anal. & Characterization and the fourth paper was submitted for publication in J. Nanostructured Polym. & Nanocomposites. The topics of the papers are focused, in coincidence with the title of thesis, on behaviour of inorganic filler in polymer environment from the point of view of change the morphology, physical and mechanical properties of the formed composite.

In the PVC/clay nanocomposite, the candidate studied structural characteristics of the composite, but also the influence of conditions of its preparation. At the optimization of the effect of shearing and temperature from the point of view of intercalation of PVC into galleries of the clay it was found that organophilic clay shifted the degradation temperature of PVC towards higher temperatures compared to chemically untreated natural clay (Paper 1). The second paper (2) continues the study of thermal stability of PVC nanocomposite. At the PVC processing at higher temperature of and in the presence of organophilic clay a better morphology is obtained (better dispersion of filler) but the modifier-quaternary ammonium salts, showed also an opposite effect. It facilitates PVC decomposition (Paper 2). On the other hand, sample filled with Cloisite Na<sup>+</sup> as a representative of a bad intercalated filler, improves thermal stability and decreases HCl releasing from PVC. These results have shown that at chemical modification of a filler not only its improvement of intercalation is needed to be followed, but also its thermal stability.

In the next paper (3) the author has shown, that one of the most popular commercial filler denoted Nanofil SF 3000 (from the point of view of easy intercalation with polymer) showed the worst thermal stability. The Figures. 5 and 6 show thermal durability of PP and PP/organoclay nanocomposites under non-isothermal and isothermal heating. The figures show two important facts – first that the chemical modification of clay can significantly decrease the temperature of the rate of maximal weight loss and the second that, the maximal weight loss with modified clay is much higher. These results are really very interesting and