

Characterization of two commercial nanoclays and the morphology modification of the PHB obtained

Rosa M. TORRES SANCHEZ ¹, Maria S. CONCONI¹, Adrian BOTANA², Mariana MOLLO², Patricia EISENBERG²

¹CETMIC, Camino Centenario y 506, (1897), La Plata, Argentina; rosa.torres@gmail.com; rosats@cetmic.unlp.edu.ar

²INTI Plásticos, Gral Paz 5445 (1650), San Martín, Argentina

To minimize the environmental problems generated by the conventional plastics, major worldwide chemical companies are moving towards partly replacing traditional petrochemical commodity polymers with biopolymers which would allow for the reduction of xenobiotics in the environment and in landfill loads. The biodegradable polymers, polyhydroxyalkanoates (PHAs), emerge as possible palliatives, being poly (3-hydroxybutyrate) (PHB) – the most widespread and thoroughly characterized PHAs. The use of commercial nanoclays (5-10% by weight) for the preparation of nanocomposites have received special attention because of their improved properties as compared to conventional filler composites (GARCIA-LOPEZ et al. 2003).

In this work, the effect of the process conditions (5% nanoclays, 165°C, 50 rpm and 30 min stirring) on the structure of the final material was studied for the mixtures preparation of PHB with commercial nanoclays (Cloisite Na⁺ and Cloisite 30B – both from Southern Clay Products).

The nanoclays and products were characterized by means of XRD, TEM and DTA and DSC. The specific surface area (by means of water vapor adsorption) of the nanoclays was also measured.

DTA analyses of Cloisite Na⁺ and Cloisite 30B indicate that the organic anions have a key impact on thermal stability of organoclays – which is in agreement with results obtained by CERVANTES-UC et al. (2007) - using the thermogravimetric method. An increase in the crystallization temperature and smaller size of spherulite was found for the mixtures of the clays with the PHB.

References:

- GARCIA-LOPEZ, D., PICAZO, O., MERINO, J.C., PASTOR, J. M., 2003: Polypropylene–clay nanocomposites, *European Polymer Journal* 39, 945–950.
CERVANTES-UC, J., CAUICH-RODRIGUEZ, J., VAZQUEZ-TORRES, H., GARFIAS, L., DONALD R. 2007 : Thermal degradation of commercially available organoclays studied by TGA–FTIR. *Thermochimica Acta* 457, 92–102.