



Séminaire PIMM

Jeudi 21 Octobre 2010 à 14 heures

Amphi Bézier

Arts et Métiers ParisTech, 151 bd de l'hôpital, 75013 Paris

VIEILLISSEMENT DES POLYMERES

14h00

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Doctorant PIMM

OXIDATION OF CLAY NANOREINFORCED POLYETHYLENE

Clay Nanocomposites present good properties when they are produced, however several questions regarding their degradation behavior come up: Does a clay nanocomposite exhibit a different oxidative behavior compared to those of the pure polymer? Do the degradation mechanisms of the pure matrix remain unchanged or they will be affected by the clay (*MMT-O*) presence? May the *MMT-O* result an effective catalytic agent during a thermal oxidation process of the polyolefinic matrix? Does *MMT-O* affect heterogeneous thermal oxidation when oxygen diffusion limitations drive the oxidation process?

We try to answer these questions by tracking the thermal degradation of unstabilized polyethylene clay nanocomposites at low temperatures from an experimental and a modelling point of view for degradation process not controlled and controlled by oxygen diffusion (homogeneous and heterogeneous respectively). It seems that the *MMT-O* speeds up oxidation. This phenomenon was modeled by adding a catalytic reaction between metallic particles initially present in the *MMT-O* and hydroperoxyde groups (main responsible of oxidation). Kinetics and oxidation products profiles across the sample thickness were simulated by coupling oxidation reactions with oxygen diffusion equations. Moreover, the effects induced by oxidation on molar mass and crystalline morphology were also simulated. Finally, based on structure – properties relations, simulations of mechanic modulus profiles were performed for the heterogeneous degradation case. These results were confirmed by experimental measurements of elastic modulus across the thickness of thick *MMT-O* nanocomposite samples.

14h50

Jiri Tochacek

Professeur, Brno University of Technology; Institute of Materials Science of faculty of chemistry

Effect of Polymerization Technology on Processing Stability of Polypropylene Impact Copolymers

Résumé attaché