PC 01

HYBRID LATEXES OF POLYSTYRENE/NATURAL BRAZILIAN MMT VIA EMULSION POLYMERIZATION: CONFIRMATION OF SYNERGISM EFFECT ON THE PARTICLE NUCLEATION AND LATEX STABILIZATION WHEN USING A BLEND OF MMT AND AN ETHOXILATED-SULPHATED SURFMER

F.C.T. de Souza[a], R.C.P. da Silva[b], M.L.C.P. da Silva[b], A.M. dos Santos*[,b]

[a]*Materials Engineering Department, Engineering School of Lorena, University of São Paulo, Pólo Urbo Industrial Gleba AI-6, Fazenda Mondesir, S/N, 12.602-810 Lorena/SP, Brazil*

[b]*Chemical Engineering Department, Engineering School of Lorena,University of São Paulo, Estrada Municipal do Campinho, S/N, 12.602-810, Lorena/SP, Brazil (*amsantos@dequi.eel.usp.br, http://www.eel.usp.br/dequi)*

PS/MMT hybrid latexes were synthesized by emulsion polymerization. The Brazilian Montmorillonite (MMT) was previously modified using an ethoxylated-sulphated reactive surfactant (ammonium allyloxy polyethoxy(10) sulfate – Sipomer® AES 100). The polymerizations kinetic, the nucleation mechanism and the properties of the final latexes were studied and the results were compared with crude PS latex.

The polymerizations performed in the presence of organically modified clay showed an induction time and then a high conversion was achieved. This behavior was not observed either in the reactions without modified MMT nor in those which were carried out using only the surfmer. As was expected, the reactions carried out in the presence of surfmer alone showed low conversions. The hybrid latexes obtained were then characterized by X-ray diffraction (XRD), thermogravimetry (TG/DTG), dynamic mechanical thermal analysis (DMA), differential scanning calorimetry (DSC), scanning electron microscopy (SEM), and transmission electron microscopy (TEM). XRD of nanocomposites showed no characteristic peaks of clay, indicating a possible exfoliated or at least, partially exfoliated structure which is mainly due to the special properties of the MMT modifier[1]. The onset of thermal decomposition for nanocomposites was higher than that observed for the raw polymer. The glass transition temperature did not change significantly. DMA showed an increase in the storage modulus in the presence of clay. The results confirmed a synergism effect for the couple MMT/Surfmer on the particle nucleation and the latex stabilization. The hybrid materials exhibited improved properties compared to the raw PS[2-4].

References

[1] Kim, T.H. et al. Macromol. Rapid Commun. 23 (2002) 91.
[2] Meneghetti, P., Qutubuddin, S. Thermochimica Acta 442 (2006) 74.
[3] Ruiz-Hitzky, E. Mol. Cryst. Liq. Cryst. 161 (1998) 433.
[4] Sinha Ray, S., Okamoto, M. Prog. Polym. Sci. 28 (2003) 1541.