

## **Stabilization of Immiscible Polymer Blends by Interfacial Confinement of Carbon Nanotubes**

*Baudouin Anne-Christine, Devaux Jacques, Bailly Christian*

Multiphase polymer blends have attracted tremendous attention to achieve valuable properties materials by taking advantage of the attractive features of each component. However, binary blends of immiscible polymers generally exhibit poor properties due to their coarse and unstable morphology. To generate a material exhibiting the desired properties, it is therefore essential to produce a blend with fine and stable dispersed particles. Therefore, the compatibilization of immiscible polymer blends using nanoparticles has first been reported for a few decades [1]. In this context, the morphology of blends of polyamide, ethyl acrylate copolymer and carbon nanotubes (CNTs) has been studied. The influence of mixing parameters and CNTs content on the polymer droplets size distribution has been evaluated using both TEM and SEM. This study first demonstrates that unpurified and unfunctionalized CNTs enhance phase dispersion. CNTs exhibit a length comparable or higher than the diameter of the dispersed phase. Thus, they enhance phase dispersion during processing by splitting the polymer droplets into smaller particles, leading to finer dispersion [2]. Second, CNTs can be, at least partially, confined at the interface between two immiscible polymer, taking advantage of thermodynamics, irreversible polymer adsorption on MWNTs and their subsequent migration [3]. Due to the interfacial localization, the blends behave like Pickering emulsions. The droplets of the dispersed phase are stabilized against coalescence by the CNTs adsorbed at the interface with the matrix. Moreover, this stabilization is effective for very long mixing times (at least 60 minutes) and low CNTs contents (0.5wt% CNTs). When located at the interface, CNTs can thus enhance both phase dispersion and stability of the dispersed phase. References: [1] J.E. Callan et al., Rubber Chem Tech,44(3) [2] Z.-M. Li et al., Polym Plast Technol Eng,46(2) [3] A.-C. Baudouin et al., Polym Degrad Stab,In Pres