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*PD en Química Aplicada y Materiales Poliméricos*

## THE ADDITION OF NANOSILICA AND COMPATIBILIZING AGENTS TO TAILOR THE PROPERTIES OF PP/PA6 BLENDS

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By combining silica nanoparticles (NS) and compatibilizer agents, the interfacial properties of a polypropylene (PP)/polyamide (PA6) blend can be modified, and subsequently, their morphology and mechanical performance can be tailored. To this purpose, blends of PP with 20% of PA6 and 10% of PP grafted with different amounts of maleic anhydride (as compatibilizing agent) have been prepared. Hydrophobic and hydrophilic NS were used and different NS compositions were evaluated. SEM and TEM observations showed that compatibilizing agent addition strongly reduced the polydispersity and droplet size of PA6 phase, and the effect was more pronounced when a PP with a higher grafting level was employed. Further addition of NS particles to these compatibilized blends reduced even more PA6 droplet size, in particular, when hydrophobic NS was added. These observations are a result of the preferential location of NS particles at the interface that avoids particle coalescence and confines the PA6 phase into very small droplets. The confinement produced a fractionated crystallization of PA6 droplets. This was demonstrated by self-nucleation experiments. Contact angle measurements indicated a reduction in the interfacial tension with addition of the compatibilizing agent. The values obtained predicted that NS would locate inside the PP phase rather than in the PA6 phase, and this result was confirmed by TEM. FTIR experiments demonstrated that chemical interactions due to the presence of the compatibilizing agent remained after NS addition. Since, hydrophobic NS yielded the smallest particle size, its content in the blend was varied in order to balance physical and mechanical performance. As NS content was reduced until 1.6%, droplet size was slightly increased but tensile and impact properties were improved to values comparable to the compatibilized blend without NS. Moreover, this blend with 1.6% NS exhibited improved oxygen permeability. Therefore, adjusting the amounts of compatibilizing agent and NS type and content, a PP/PA6 blend with tuned morphology and well balanced mechanical and permeability properties was achieved.