



CHALLENGES AND OPPORTUNITIES IN DESIGN OF NANOCOMPOSITES OF POLYOLEFINS

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It is now widely accepted that developing nanocomposites of polyolefins is a difficult proposition, although a number of applications in consumer and automotive industries may strongly benefit from superior properties offered by polyolefin nanocomposites. This talk discusses top-down and bottom-up approaches of development of polyolefins nanocomposites with particular emphasis on bottom-up approach. Research results are presented on development of nanocomposites of isotactic polypropylene (iPP) and polyhedral oligomeric silsesquioxane (POSS), where 1 nm size molecules of POSS are transformed into 50-100 nm particles for reinforcement of spun fibers and blown films of iPP using sorbitol-assisted dispersion and self-assembly. The talk presents the fundamentals of specific interactions between POSS and sorbitol nucleating agents and their effects of POSS dispersion and POSS self-assembly into nanoparticles. Large enhancements of tensile properties are reported with only 2-5 wt% of silanol POSS. Several heuristics are discussed on the next steps.