

## **POLYOLEFIN NANOCOMPOSITES: STRUCTURE AND PROPERTIES**

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Polymer-layered silicate nanocomposites formed from the organically modified clay mineral montmorillonite and related materials have attracted a great deal of technological and scientific interest in the past decade. These composites offer the promise of greatly improved properties over those of the matrix polymer owing to the nanoscale reinforcement and constraints of the polymer caused by dispersing the one nanometer thick, high aspect ratio aluminosilicate layers. However, the key to achieving these benefits is dispersing the organoclay into the polymer matrix to generate high aspect ratio particles. The preferred route to making such nanocomposites is melt-processing techniques. This presentation will give a status report on what is known about generating the structure of nanocomposites based on polyolefins. Many factors are involved in achieving a high level of dispersion, or ultimately full exfoliation, but one of the most important is the complex interaction of the polymer matrix with the organoclay. One approach is to make the polyolefin more polar (e.g., addition of maleation) while another is to optimize the structure of the organoclay. Both routes will be discussed separately and in combination; comparisons will be made with polyamides where exfoliation is much more facile. Properties of various polyolefin nanocomposite formulations will be described in detail and compared to predictions from composite theory. Some commercial applications of such nanocomposites will be briefly mentioned.