

Techmer PM's Nanoclay Technology Improves Barrier Film Properties

The pundits agree: Nanotechnology heralds a revolutionary new era in materials science. Being able to manipulate material structures and components at the scale of billionths of a meter ("nano" means billionth) opens up entirely new potentials, ushering in prospects for unprecedented improvements in material properties.

"Nanotechnology holds particular promise for plastics and packaging. Until recently, however, progress in exploring some of the new horizons has been disappointingly slow," admits Ebrahim Mor, Vice President of Technology at Techmer PM. "Now, that's changing fast for nanoclay technology," he asserts.

Techmer PM has just scored a breakthrough in using nanoclay to boost the properties of polyamide films. Adding small amounts of tiny nanoclay particles to nylon 6 films produces major increases in physical properties.

"It's really dramatic," says Mr. Mor. "With 2% nanoclay loading, a 2-mil polyamide film's tensile strength zooms 46%, to 10,195 pounds per square inch, and elongation increases by 38%. Moreover," he adds, "there are only minor effects on the film's clarity, optical transmission, and haze characteristics. We measured a drop of a mere 1.2% in clarity and 2.2% in transmission--and haze actually decreased three percentage points, to 19%."

With a 5% nanoclay loading, Techmer PM's 2-mil nylon 6 test film exhibits slightly less amazing jumps in tensile strength and elongation--up 38% and 25%, respectively--together with more pronounced optical effects. For example, clarity declines 29 percentage points, to 53%, while haze grows 11 points, to 33%.

"We expect that higher levels of nanoclay will substantially improve the barrier properties of polyamide films, so the tradeoff in optics may appeal to many customers. We're working now to quantify the performance of nanoclay films in terms of oxygen and water-vapor permeability and chemical resistance," says Mr. Mor. University research shows that even 2% nanoclay loadings can improve the gas-barrier properties of nylon films by about 40%.

Using nanoclay particles has long been hampered by problems with exfoliation, or getting the clay to spread out evenly through the polymer matrix. The particles naturally tend to clump together. Chemical treatment can alleviate that. But controlling the alignment of the clay platelets takes exfoliation technology to a higher plane.

Techmer PM is a major producer of value-added color and additive masterbatch for the plastics and fiber industries. The company has worldwide manufacturing capabilities focusing on high-performance applications where quality, technical support, and problem solving are critical.

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