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Polymer-Clay Nanocomposites Exhibit Unique Properties

University Park, Pa. - March 26, 2001 - Small amounts of well-dispersed natural clay can lead to environmentally friendly and inexpensive plastic composites with improved specialized properties, according to a Penn State researcher.

"Adding very small amounts of natural clays to plastics changes some of their physical properties," says Dr. Evangelos Manias, assistant professor of materials science and engineering. "While we can tune the chemical interactions between the clays and some polymers, it is the general changes due to the nanometer fillers in all plastics that may be the most interesting."

Addition of clay can make plastics less permeable to liquids and gases; more flame retardant and tougher. Lower permeability can make plastics like PET, the standard plastic used in soft drink bottling, suitable for bottling beer or wine. The clay-enhanced product would protect the beverages from the effects of oxygen. At the same time, the addition of small amounts of clay does not affect the transparency of plastics.

Adding clay to polymer blends is not a simple process as polymers and clays mix about as well as oil and water. However, if the clay is treated with an organic surfactant, a compound that allows the inert clay to mix with the polymers, much as soap allows oil and water to mix, the clays can be incorporated into the final product.

An inexpensive, more environmentally clean method of producing flame retardant plastics could eventually save lives. Because the addition of clay into plastics reduces flammability in a wide range of plastics, it may have universal application as a general flame retardant additive.

"Currently, chemicals used to make plastics flame retardant