Toward a new generation of superplastics

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A substance made from natural clay (shown), the material used to make pottery, may be spinning its way toward use as an inexpensive, eco-friendly replacement for a compound widely used to make plastic nanocomposites.

Scientists are reporting an in-depth validation of the discovery of the world's first mass producible, low-cost, organoclays for plastics. The powdered material, made from natural clay, would be a safer, more environmentally friendly replacement for the compound widely used to make plastics nanocomposites. A report on the research appears in ACS' journal *Macromolecules*.

Miriam Rafailovich and colleagues focused on a new organoclay developed and patented by a team of scientists headed by David Abecassis.

The scientists explain that so-called quaternary amine-treated

organoclays have been pioneering nanoparticles in the field of plastics nanotechnology. Just small amounts of the substances make plastics flame retardant, stronger, and more resistant to damage from ultraviolet light and chemicals. They also allow plastics to be mixed together into hybrid materials from plastics that otherwise would not exist.

However, quaternary amine organoclays are difficult to produce because of the health and environmental risks associated with quaternary amines, as well as the need to manufacture them in small batches. These and other disadvantages, including high cost, limit use of the materials.

The new organoclay uses resorcinol diphenyl phosphate (which is normally a flame retardant), to achieve mass producible organoclays which can be made in continuous processing. In addition these organoclays are cheaper, generate less dust, and are thermostable to much higher temperatures (beyond 600 degrees Fahrenheit). This clay has also been proven to be superior for flame retardance applications. In addition, unlike most quaternary amine based organoclays, it works well in styrene plastics, one of the most widely used kinds of plastic.

More information: "The Role of Surface Interactions in the Synergizing Polymer /Clay Flame Retardant Properties", *Macromolecules*.

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