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Fabrication of Aluminosilicate Nanorods having Customized Dimensions

Background

Nanoparticles are currently in use across a vast array of consumer products. They find application in scratch resistant coatings, active ingredients in sunscreens, stain repellant fabrics, nanoparticle-strengthened steels, and also broadly to the production, processing, safety and packaging of food. Nanotechnology is conducted at the nanoscale, which is between 1 to 100 nanometers (nm). As comparison, a human hair is about 75,000 nanometers in diameter. For application to polymer composites in particular, nanoparticles having a rod like or whisker shape on the nanoscale are desirable.

Researchers at Arizona State University have invented a cost effective, scalable method to make Aluminosilicate nanorod particles with a controllable shape, having specific nanorod dimensions and high aspect ratio (a length of the nanorod divided by a width of the nanorod). These dimensions may be controlled through synthesis conditions such as water content, pH, reaction time, temperature and materials selection to achieve application-specific diameters of 30–50 nm, and lengths of 200–800 nm.

Potential Applications

- Rheology Additives
- Polymer/Rubber Composites
- Medical Treatments
- Membrane Technologies
- Nanocatalyst Substrates

Benefits and Advantages

- Unprecedented Control of the Aluminosilicate Nanostructure – Aspect ratios of 3 and greater achieved, advantageous for Aluminosilicate application to nanorod composites.
- Lower Cost – Allows for use of Aluminosilicate Nanorods in Polymer Composite Applications; other nanorod materials cost prohibitive.
- Scalable Synthesis Method – standard methods compatible with large scale production demonstrated.
- Reduced Capital Costs – Method of synthesis does not require significant capital equipment costs or overhead when compared to other methods for production of nanoparticles or nanorods.

For more information about the inventor(s) and their research, please see:

Prof. Don [Dong-Kyun] Seo's Research Page