The world is our inspiration

Press release

Communiqué de presse

Nano tech

Tokyo – February 17-19 2010

Hall 5 East – Stand C40

Arkema, a global chemical manufacturer and nanomaterial leader

A global chemical company and leader in the field of nanostructured materials, Arkema is pursuing its R&D commitment to develop increasingly effective and lightweight materials.
Arkema will present its two product lines dedicated to « nanomaterials » at the Tokyo Nano tech tradeshow: new masterbatches from its ***Graphistrength®*** carbon nanotube product line, and its range of ***Nanostrength®*** acrylic block copolymers used to nanostructure within selected polymers and impart improved properties.

GraphiSTRENGTH® Advanced Materials

NANOSTRENGTH® Advanced Materials

A global chemical company and France's leading chemicals producer, Arkema consists of three businesses: Vinyl Products, Industrial Chemicals, and Performance Products. Arkema reports sales of 5.6 billion euros. Arkema has 15,000 employees in over 40 countries and six research centers located in France, the United States and Japan. With internationally recognized brands, Arkema holds leadership positions in its principal markets.

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GraphiSTRENGTH® Advanced Materials

Arkema offers new masterbatches based on its carbon nanotubes

Since its initial commitment to producing carbon nanotubes (CNTs) in 2006, Arkema has worked on the development of a comprehensive range of high added value masterbatches under the trademark *Graphistrength*® designed to optimise the performances of CNTs in various polymer matrices.
At Nano tech 2010 in Tokyo, Arkema will present a range of innovations within its *Graphistrength*® range: a universal grade for various thermoplastics, new grades for elastomers, and solid concentrates for liquid epoxy and aqueous solutions.

Arkema ranks among world leaders in multiwall CNTs. Its high performance masterbatches developed for various thermoplastic, elastomer or thermoset polymer matrices help combine outstanding benefits in terms of performance:

- in product manufacture: easy to use, these masterbatches keep the compound manufacturing process straightforward, with no equipment adaptation or investment required from the processor's viewpoint.
- in the quality of end-products: they ensure excellent dispersion of CNTs in the manufactured product, guaranteeing remarkable end-performances, in particular excellent conductivity and electrostatic dissipation (ESD).

The first universal masterbatch: *Graphistrength*® CM12-30

Graphistrength® CM12-30 is the only CNT masterbatch on the market with a 30% CNT content suitable for a wide range of thermoplastic matrices: polyamides (6, 6.6, 12), polyesters (PET, PBT), and polycarbonate or polyacetals. For processors manufacturing these various compounds, the application versatility of ***Graphistrength***® CM12-30 makes for an easier manufacturing process.
This new masterbatch can be fully diluted within the thermoplastic matrix, allowing homogeneous dispersion of CNTs. This dispersion helps produce compounds with remarkable electrostatic dissipation (ESD) properties for low CNT concentrations in the finished material.
Arkema will shortly be marketing a grade for polyolefins, ideal for the sheathing of cables or the coating of components for electronics applications requiring ESD properties.

New grades for elastomers

Arkema has developed new masterbatches, ***Graphistrength***® *CE1-20, CE2-40* and *CE3-35*, containing up to 40% CNTs, specifically for elastomer matrices, respectively fluoro-elastomer, nitrile, and silicone. These products can easily be diluted and used in complete safety using standard equipment.

They are used to prepare materials that combine ESD properties with superior mechanical strength for low CNT concentrations, such as elongation at break. This grade is particularly suitable for the manufacture of joints with ESD properties, which are highly sought after in the automotive and aerospace industries.

Two solid concentrates for liquid epoxy and aqueous solutions

Liquid epoxy dispersions are already available on the market that are designed to boost the mechanical strength and the conductivity of epoxy composites. However, one drawback of these dispersions is their low CNT content, of the order of just a few percents, which significantly limits the flexibility of the formulation.

Arkema has therefore developed the first concentrates in the form of solid granules which contain up to 25% CNTs and can be fully dispersed in liquid epoxy and aqueous solutions. These concentrates are ideal for use both in composites and in adhesives, ink or paint.

Arkema announced in September 2009 the construction of a carbon nanotube pilot production plant at its Mont site (Pyrénées-Atlantiques, SW France). Scheduled to start up in early 2011, this 400 ton/year plant will operate a novel process, and will be the only CNT production plant in the world to use a fully bio-sourced raw material.

As a responsible manufacturer, in accordance with the precautionary principle, Arkema put in place from the launch of the project a CNT-dedicated health, safety, environment initiative to ensure the protection of its employees and the environment.

Comprehensive information is available on the website
www.graphistrength.com

ARKEMA
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NANOSTRENGTH®
Advanced Materials

Nanostrength®, a unique range of nanostructuring acrylic block copolymers

In the ever-expanding field of nanotechnology, nanoscale morphology control has been demonstrated as a useful approach to impart beneficial property combinations within composite materials. However, many new technologies have yet to significantly materialise industrially due to economical or process constraints. To fill this gap, Arkema has developed an innovative solution based upon acrylic block copolymers under the trademark *Nanostrength*®.

Nanostrength®, when added to select thermoplastic or thermoset matrices can self-assemble on a nanometer length scale bringing unique properties to the final composite material such as, superior mechanical strength or hydrophilicity without losing any of the important properties inherent to the matrix material (e.g., glass transition temperature, transparency, chemical resistance, etc). Arkema is currently the world's leading chemicals producer to market such a product range, which it is steadily expanding.

Three ***Nanostrength***® product ranges are available:
- MMA copolymers containing two polymethylmethacrylate endblocks and a polybutylacrylate central block
- MMA copolymers containing functional groups in either the central block and/or external blocks
- Polystyrene, polybutadiene and polymethylmethacrylate (SBM) block copolymers.

Nanostrength® block copolymers are made up of two or more covalently linked and chemically distinct segments , which inherently self-assemble or "nanostructure" at the molecular level. This phenomenon is due to the covalent linkage between the two dissimilar blocks, which typically strongly repel one another.

The thermodynamic driving force behind this organization leads to highly reproducible and accurate ordering. ***Nanostrength®*** can be readily blended with (and nanostructure within) homopolymers, blends or solutions as long as one block segment is miscible with the matrix material. The resulting reproducible structuration leads to unique and tailored end-use property enhancements.
Four representative examples of ***Nanostrength®*** benefits follow:

- Adhesives

Key properties: superior adhesion, simple formulations, excellent green strength

- Rigid thermoplastic materials

Key properties: reinforcement, compatibilisation, transparency, etc.

- Flexible thermoplastic materials and rubber

Key properties: compatibilisation, superior rheology, etc.

- Thermoset materials

Key properties: superior resistance to crack propagation, simple processing, etc.