



SUMITOMO CHEMICAL

ADVANCED TECHNOLOGIES

For Immediate Release: 17 September 2018
PR # SCAT-02-18

PES ADDITIVE BOOSTS FRACTURE TOUGHNESS, MICRO-CRACK RESISTANCE IN EPOXY COMPOSITES

Already used in epoxy-based aerospace composites and gaining ground in automotive, micro-powder additive will be exhibited at CAMX 2018

Phoenix, Ariz., U.S. — A polyethersulfone (PES) micro-powder additive called SumikaExcel™ 5003P, has proven ideal for boosting fracture toughness and resistance to micro-cracking for fiber-reinforced epoxy composites over a broad temperature range without negatively impacting dimensional stability, flame/smoke/toxicity (FST), creep resistance, modulus, impact, or yield strength. The functional additive is widely used by the aerospace industry for prepreg and resin-transfer molded carbon fiber-reinforced epoxy, is gaining ground in epoxy composites for automotive, and could be used for high-performance sporting goods as well. The material is produced by Sumitomo Chemical Co. Ltd. (Tokyo) and is sold in North America by Sumitomo Chemical Advanced Technologies, LLC (here), which will exhibit for the first time at the Composites & Advanced Materials Expo (CAMX) from October 16-18 in Dallas.

Generally speaking, PES is an amber-transparent, amorphous engineering thermoplastic known for its high temperature capabilities¹, high strength and impact resistance, excellent creep resistance at elevated temperatures and loads, very-good dimensional stability, low coefficient of linear thermal expansion (CLTE) over a broad temperature range, inherent flame retardance², low smoke, minimal outgasing, good and broad chemical resistance³, and resistance to hot water (to 180°C). It is offered pelletized for injection molding, extrusion, and film processes and in powder form for cast films, filtration membranes, and as an epoxy additive for composites, high-temperature paints and coatings, and adhesives. PES grades are used in the aerospace, automotive, electrical/electronics, medical-device, and food-handling industries.

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¹ PES has the highest thermal resistance among amorphous thermoplastics. Depending on grade selected, properties include: glass-transition temperature (T_g) to 225-230°C, continuous-use temperature to 200°C, and distortion temperature under load (DTUL) to 215°C @ 1.8 MPa.

² UL® V-0 down to 0.41 mm.

³ PES is generally resistant to cleaning solvents, oil, grease, gasoline, ethanol, and chlorofluorocarbons, but is affected by polar solvents like acetone and chloroform.



SUMITOMO CHEMICAL Co., Ltd.

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PES Additive Boosts Performance of Epoxy-Based Composites *2-2-2-2*

In its role as a functional additive for epoxy composites, specific grades with hydroxyl (-OH) end groups are used. The end groups react with glycidyl groups on the epoxy matrix to form a cross-linked, interpenetrating polymer network (IPN). Even though the additive is typically used at low letdown ratios of 2-12 wt-%, it adds greater flexibility to the IPN, which in turn boosts the toughness of the epoxy composite. SumikaExcel™ 5003P has a glass-transition temperature (T_g) of 230°C, which is higher than that typical of aerospace-grade epoxy resins (ranging from 120-200°C), and since it also has good stiffness and strength, it improves impact and crack resistance without compromising other thermo-mechanical properties. Especially important for aerospace applications, it does all this without affecting FST or the ability to mold and hold very-tight tolerances. Although it is most commonly used with high-performance carbon fiber-reinforced epoxy composites, it is equally effective in glass- or basalt-reinforced epoxy composites too.

Sumitomo Chemical is unique in the plastics industry as the world's sole PES manufacturer that maintains dedicated PES polymerization facilities (in Chiba and Ehime, Japan) and also a dedicated micro-level powder grinding facility (in Phoenix, Ariz., U.S.). This eliminates the possibility of cross-contamination with other polymers — a critical and highly enforced requirement in the aerospace industry — and also simplifies the supply chain for processors and OEMs. Powders as fine as 30 μm and as large as 500 μm are produced at the Phoenix facility using rotary-classifier grinding mills, which are more efficient and accurate than conventional grinding units. Additionally, laser-diffraction characterization equipment is used to measure particle size in both incoming feedstock and outgoing finished powder, and an inductively coupled plasma device checks every lot for metals before and after grinding operations to ensure that the product meets specification requirements. SumikaExcel™ 5003P is typically supplied in 15-kg bags and 600-kg supersacks, although custom packaging is available upon request.

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ADVANCED TECHNOLOGIES

PES Additive Boosts Performance of Epoxy-Based Composites
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For the first time, Sumitomo Chemical Advanced Technologies will exhibit at CAMX 2018 in booth number G86 and will have information about SumikaExcel micro-powder additive as well as its other families of high-performance engineering thermoplastics, including SumikaExcel PES, SumikaSuper™ liquid crystal polymer (LCP), and Sumiploy™ polymer alloys on display for attendees.

Sumitomo Chemical Advanced Technologies LLC, formerly called Sumika Electronic Materials and a wholly owned subsidiary of Sumitomo Chemical Co., Ltd., is a leading manufacturer of polyethersulfone (PES), liquid crystal polymer (LCP), and high-performance alloy resins. The company serves as the U.S. base of operations and customer support for Sumitomo Chemical's photoresist and engineering plastics businesses and is certified to ISO9001:2008 and ISO14001:2004 standards. For more information, see <http://www.sumikamaterials.com/> or call +1.602.659.2500.

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™ SumikaExcel, SumikaSuper, and Sumiploy are trademarks of Sumitomo Chemical Co., Ltd.



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Phoenix, Ariz., U.S. — SumikaExcel™ 5003P polyethersulfone (PES) micro-powder additive — produced by Sumitomo Chemical Co. Ltd. (Tokyo) and sold in North America by Sumitomo Advanced Technologies, LLC (here) — has proven ideal for boosting fracture toughness and resistance to micro-cracking for fiber-reinforced epoxy composites over a broad temperature range without negatively impacting dimensional stability, flame/smoke/toxicity (FST), creep resistance, modulus, impact, or yield strength. SumikaExcel™ 5003P is typically supplied in 15-kg bags and 600-kg supersacks, although custom packaging is available upon request. In the photo above, Marvin Robey, lead grinding technician, Sumitomo Chemical Advanced Technologies, fills a 15-kg bag with SumikaExcel 5003P micro-powder additive.

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Attention Editors: High-resolution digital photography is available upon request.

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Phoenix, Ariz., U.S. — Sumitomo Chemical Co. Ltd. (Tokyo) is unique in the plastics industry as the world's sole polyethersulfone (PES) manufacturer that maintains dedicated PES polymerization facilities (in Chiba and Ehime, Japan) and also a dedicated micro-level powder grinding facility (here). This eliminates the possibility of cross-contamination with other polymers—a critical and highly enforced requirement in the aerospace industry—and also simplifies the supply chain for processors and OEMs. Powders as fine as 30 μm and as large as 500 μm are produced at the Phoenix facility using rotary-classifier grinding mills, which are more efficient and accurate than conventional grinding units. Additionally, laser-diffraction characterization equipment is used to measure particle size in both incoming feedstock and outgoing finished powder, and an inductively coupled plasma device checks every lot for metals before and after grinding operations to ensure that the product meets specification requirements. After dedicated grinding and laser measurement of particle size, SumikaExcel™ 5003P PES micro-powder additive is visually inspected by Marvin Robey, lead grinding technician, Sumitomo Chemical Advanced Technologies, LLC before shipment to a customer. An inductively coupled plasma device checks every lot for metal before and after grinding operations.

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