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Available Technologies

Composite Reinforcements: Improved Properties of Fiber/ Polymer Composites via Novel Self-Assembled Monolayer Fiber Coating

SUMMARY

Reinforcements of composites can consist of fibers, particles, or whiskers. They each have their own unique uses, but long fibers are the most common and have the greatest influence on properties of the composite. Fibers add the strength to the composite in the direction of the long axis.

The interface between a fiber and a polymer matrix is the Achilles' heel of a glass/polymer composite. Adhesion between the two phases is critical, as is the degree of flexibility within the interfacial region. A glass surface composes a polar hydrogen bonding chemical environment, whereas the polymer matrix tends to be more hydrophobic and non-polar. The net result is that the interfacial interactions are weak, leading to poor adhesion and facile interfacial cleavage or displacement.

Presented here is a novel surface modification of the reinforcing fiber - a coupling agent consisting of a self-assembled monolayer (SAM) - the result of which would be very good in high fatigue applications or even in severe composite environments that could increase or maintain the physical properties of the material.

ADVANTAGES

- * Greater mechanical strength of the polymer and reinforcing fiber bonding, which increases the composite's tensile and flexural properties
- * Complete and uniform coverage spreads the load out evenly over a large area of the glass fiber, reducing composite failure due to fiber shear
- * Improved environmental resistance due to a better bond between the glass and the resin.



Patents & Intellectual Property

- » Patent #: 6,723,426

Technology Portfolio(s)

- » Materials Forming, Joining and Deposition
- » Materials Synthesis and Functionalization
- » Supercritical Fluid Processing

Potential Industry Applications

- » Aerospace & Defense
- » Automotive & Transportation
- » Chemicals
- » Computers & Electronics
- » Consumer Products
- » Energy & Utilities
- » Oil & Gas

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