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PRESS RELEASE

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K 2010
WACKER presents a dispersible and high-efficiency impact modifier for epoxy resins

Munich, October 27, 2010 – Munich-based chemicals Group WACKER will be attending K 2010, the 18th International Trade Fair for Plastics + Rubber, with a powder additive that significantly improves the impact strength of epoxy resins without compromising their mechanical strength or heat resistance. The dispersible product, sold under the name GENIOPERL® P52, is efficient even in small amounts. Epoxy adhesives containing GENIOPERL® P52 can withstand heavy stresses caused by shock and vibration. K 2010 will take place from October 27 to November 3 in Düsseldorf, Germany.

The impact modifier, which is dispersible in the uncured epoxy reaction resin, consists of spherical particles of equal size. These are composed of a soft-elastic, crosslinked silicone core and a hard shell made of an organic polymer. In the powder additive, the core-shell particles are present as agglomerates with a particle size in the double-digit micron range. The agglomerates disintegrate completely when mixed into the liquid epoxy reaction resin.

The core-shell particles distribute themselves evenly throughout the resin matrix. The polymer shell has a special structure that allows the particles to bond to the reaction resin and yield a stable, fine dispersion.

It is the stability of this fine dispersion in the liquid resin and the structure of the dispersed particles which make the additive highly efficient. In contrast to conventional impact modifiers, it takes only relatively small quantities of GENIOPERL® P52 to significantly reduce the brittleness of the cured resin. Since the amounts used are small, the epoxy resin retains its characteristic properties, especially its high rigidity and high softening point.

The particulate nature of GENIOPERL® P52 dictates the structure of the fine disperse phase. The advantage to processors is that they can thus reproducibly adjust the end properties of the modified epoxy resin. In particular, the level of toughening is not dependent on the process conditions that prevail while the resin is curing. The special structure of the additive simplifies processing, too: the viscosity of the uncured resin mixture increases only slightly during mixing.

The toughening effect of the additive stems from the fact that the elastic silicone cores deform differently than does the resin matrix when exposed to shock. As a result of the different deformations, the energy introduced during a shock is dissipated over a larger volume than it is in a non-modified resin. In addition, the energy is absorbed in the vicinity of the particle-resin phase boundary. As a result, shock- or vibration-induced cracks in the resin matrix do not propagate uncontrollably. Since the silicone domains remain soft-elastic down to around minus 110 degrees Celsius, the toughening effect is retained even at very low temperatures.

Epoxy reactive resins crosslink to yield thermosets with very high strength, heat resistance and chemical resistance. Furthermore, they adhere excellently to many different kinds of substrates. These properties explain why epoxy resins enjoy such widespread use in industry, constituting the matrix material of many structural adhesives. One disadvantage of cured epoxy resins, however, is their brittleness. Especially at low temperatures, they are susceptible to shock and other dynamic stresses.

Toughness modification reduces this brittleness. With GENIOPERL® P52, for example, the layers of the adhesive can be rendered much more durable and reliable.

Visit WACKER at K 2010 in Düsseldorf, Hall 06, Booth A10.

WACKER will be introducing the new GENIOPERL® P52 impact modifier at the K 2010 plastics trade fair. The powder additive increases the impact strength of epoxy resins without impairing their mechanical strength or heat resistance. With GENIOPERL® P52, the layers of the adhesive can be rendered much more durable and reliable. (Photo:Wacker Chemie AG)

Note:
This photo is available for download at

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The company in brief:
WACKER is a globally-active chemical company with some 15,600 employees and annual sales of around €3.7 billion (2009).
WACKER has 26 production sites and over 100 sales offices worldwide.

WACKER SILICONES
Silicone fluids, emulsions, rubber and resins; silanes; pyrogenic silicas; thermoplastic silicone elastomers

WACKER POLYMERS
Polyvinyl acetate and vinyl acetate copolymers in the form of dispersible polymer powders, dispersions and solid resins used as binders for construction chemicals, coatings, adhesives, paints, plasters and nonwovens

WACKER BIOSOLUTIONS
Biotech products, such as cyclodextrins, cysteine and biologics, as well as fine chemicals and polyvinyl acetate solid resins

WACKER POLYSILICON
Polysilicon for the semiconductor and photovoltaics industries

Siltronic
Hyperpure silicon wafers and monocrystals for semiconductor devices