

News Release

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Merck KGaA, Darmstadt, Germany, Showcases Innovative Effect Pigments and Processes at K2016

- **IM3D: 3D effects in plastics**
- **Stable effect: Effect pigments with WAY technology are UV-resistant and those from the new Thermaval™ series withstand high temperatures**
- **New trend guide for consumer goods and electronics**
- **Minirobots make the advantages of functional pigment innovations come alive**
- **Live laser demonstration: permanent marking with transitory light**

Darmstadt, Germany, October 18, 2016 – Merck KGaA, Darmstadt, Germany, a leading science and technology company, is presenting innovative effect pigments and processes at K2016, the top trade fair for plastics and rubber, from October 19 to 26 in Düsseldorf, Germany. In Hall 8a at Stand E40, visitors can see the fascinating effects of our developments in the area of decorative and functional pigments, and experience and understand the effects based on impressive examples. To a certain extent, visitors can also take the effects home.

IM3D: New processes create a third dimension in plastics designs

Merck KGaA, Darmstadt, Germany, thinks beyond boundaries and makes the optical appearance of its effect pigments stand out from the 2D plane. With the new IM3D technology, the design elements seem to literally come out of the plastic and towards the viewer although the surface is completely smooth. The three-dimensional effect is created during the in-mold process thanks to the structuring of extruded films that contain effect pigments.

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Whether for automotive interior, consumer electronics, plastic dishes and covers, or food and cosmetics packaging, the new 3D effect with remarkable depth takes plastic parts to a new optical dimension. And it provides manufacturers with an opportunity to underscore the value of their brand and thus to literally rise above the competition.

Color-stable effects in wind and weather, light and dark

With WAY, Merck KGaA, Darmstadt, Germany, has developed a technology that makes pigments uniquely stable. Due to their stability, products with the WAY designation, such as Iriodin® 119 WAY, are not only superbly suitable for thermoplastic applications; they are also weather- and lightproof and resist photoactivity. This also makes WAY pigments appealing for outdoor uses with a high stability requirement, such as automotive interiors/exteriors, decorative furniture and architecture.

Inorganic stabilization is temperature-stable up to 800°C and suitable for use in the food industry. While conventional organic stabilization is not temperature-stable and cannot be used for food packaging, WAY pigments from Merck KGaA, Darmstadt, Germany, are an attractive solution for striking designs for presenting food and beverages.

New pigment series for high-temperature application

Merck KGaA, Darmstadt, Germany, has launched Thermaval™, a new series of effect pigments for the high-temperature range. The pearlescent pigments remain stable up to 1,100°C and are therefore suitable for the striking design of ceramics and high-performance plastics that must withstand high usage temperatures. The four pigments from the patented Thermaval™ series with a metallic appearance are Thermaval™ Metallic Silver, Thermaval™ Metallic Gold, Thermaval™ Metallic Copper, and Thermaval™ Metallic Red.

Five plastic styling trends for modern consumer goods

Who knows today what will be popular tomorrow? The trend scouts from Merck KGaA, Darmstadt, Germany, do! That's because as a global player, Merck KGaA, Darmstadt, Germany, is active in numerous markets and industries worldwide. An international team continually exchanges ideas and information about trends and

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developments. Now the team has developed a tool that summarizes visions for plastics applications. The global Consumer and Lifestyle Inspirations tool describes five trends, explains how they can be put into practice, and presents colors, effects and technologies that are suitable for implementing them.

Functional pigments put to the test: minirobots make a big impression

The effect of functional pigments is intrinsically hidden. To help make their effect visible, Merck KGaA, Darmstadt, Germany, has deployed ultramodern technology, minirobots that are created using fiber melting deposition (FMD) 3D printers. The little robots brilliantly illustrate the versatility not only of 3D printing, but also of prototyping itself, in order to test whether the planned use of functional materials will work as envisioned. Laser-sensitive Iriotec® 8000 pigments were incorporated in the material for the small figures. As a result, with the aid of laser light, circuits can be placed directly on the plastic using the laser direct structuring (LDS) process and all types of labels or markings can be incorporated in the plastic. LEDs on the little robots light up solely through circuits on their bodies. In addition, they are labeled with visible markings in the plastic.

Laser direct structuring (LDS) eliminates the need for separate circuit boards in production and assembly because the circuits are applied directly on the component. For this purpose, the laser beam “draws” the circuit diagram on the plastic and activates the functional pigments where the material for the circuit should subsequently be deposited during selective metallization. LDS can also be used on uneven surfaces and thus turns plastic or powder-coated components into 3D circuit carriers.

Laser markings with functional pigments from Merck KGaA, Darmstadt, Germany, have the advantage that they are applied only with light and without any consumables, and then they remain indestructibly in place, wear-resistant and without ever fading. A demo tool impressively illustrates the shades laser markings can have – from black to all conceivable grayscale shades to white. The images show buildings around the world that stand for eternity, as well as the markings themselves that identify the buildings.

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As a memento of the innovative strength of Merck KGaA, Darmstadt, Germany, the company has come up with something special for its visitors at K2016: Guests can enter any text on a tablet computer and send it to a laser, which will then mark this text permanently and indestructibly on a ruler, a luggage tag or a travel toothbrush.

The Merck KGaA, Darmstadt, Germany, stand will be located in Hall 8a, Stand E40 at K2016 in Düsseldorf, Germany, from October 19 to 26.

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About Merck KGaA, Darmstadt, Germany:

Merck KGaA, Darmstadt, Germany, is a leading science and technology company in healthcare, life science and performance materials. Around 50,000 employees work to further develop technologies that improve and enhance life – from biopharmaceutical therapies to treat cancer or multiple sclerosis, cutting-edge systems for scientific research and production, to liquid crystals for smartphones and LCD televisions. In 2015, Merck KGaA, Darmstadt, Germany, generated sales of € 12.85 billion in 66 countries.

Founded in 1668, Merck KGaA, Darmstadt, Germany, is the world's oldest pharmaceutical and chemical company. The founding family remains the majority owner of the publicly listed corporate group. Merck KGaA, Darmstadt, Germany, holds the global rights to the Merck KGaA, Darmstadt, Germany, name and brand. The only exceptions are the United States and Canada, where the company operates as EMD Serono, MilliporeSigma and EMD Performance Materials.