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For Displays and More: Merck KGaA, Darmstadt, Germany, Presents Expanded Portfolio and New Developments at SID Display Week 2015

- **Ultra-Brightness FFS technology rapidly takes over premium brand displays**
- **With addition of photoresists and siloxane materials, portfolio offers more comprehensive solutions for display customers**
- **OLED materials become established in market**
- **Use of liquid crystals in windows and antennas opens up new fields of applications**

Darmstadt, Germany, May 20, 2015 – Merck KGaA, Darmstadt, Germany, a leading company for innovative and top-quality high-tech products in the healthcare, life science and performance materials sectors, will be presenting an expanded product range at the SID Display Week 2015. With its state-of-the-art liquid crystal mixtures for displays, Merck KGaA, Darmstadt, Germany, has been the global market and technology leader for many years. The acquisition of AZ Electronic Materials has added further specialized materials used in producing displays to its portfolio. Merck KGaA, Darmstadt, Germany, will continue to present itself with the slogan “The Perfect Pixel”, and customers from the display sector can now build upon broad expertise in both areas. “The fact that we are positioned more broadly helps us intensify our work on new technologies. We’re also forgoing the classical fields of applications in displays and breaking new ground, such as with liquid crystals for windows or antennas,” says Roman Maisch, Head of Marketing and Sales in the Display Materials business unit and one of the speakers at the SID Business Conference.

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Always a step ahead with LC materials for displays

Innovative, energy-saving ultra-brightness fringe field switching technology (UB-FFS) enjoys the highest recognition from experts, as evidenced by prestigious awards such as the German Innovation Award or the Meyer-Galow Prize for business chemistry. It very quickly became established in the market under the licristal® brand and is already being used in mass production. UB-FFS supports the trend toward ever-higher resolution in conjunction with optimized light transmission. The technology, which is suitable for nearly all display applications, uses 15% more light from the display backlighting, thus reducing the energy requirement of the devices by 30%. In addition to this, Merck KGaA, Darmstadt, Germany, is developing further innovative technologies that can be discussed with the experts on site: Blue Phase technology can simplify the manufacture of LC displays since it does not require any orientation layers. At the same time, it reduces switching times to less than one millisecond and improves contrast values with minimum viewing angle dependency. The Uniform Lying Helix (ULH) technology has a fundamentally new switching mechanism based on flexoelectric properties of innovative liquid crystals. It thus enables very high light transmission, faster switching times and wider viewing angles. The SA-VA technology takes the “green” trend into account by optimizing the manufacturing process for displays, which reduces costs.

Portfolio for display customers expanded

The trend toward screens with higher resolution and brightness as well as faster refresh rates necessitates the use of highly developed photoresists. The light-sensitive organic materials are utilized in the manufacture of thin-film transistors of LC and OLED displays to structure the surface – often in several layers. Merck KGaA, Darmstadt, Germany, can now offer its LCD customers such photoresists and other process chemicals for flat screens from a single source and is thus the world’s leading manufacturer. The offering is augmented with silicon-based materials. Polysiloxanes have excellent planarization and electrical insulation properties. They can be used as planarization layers and/or low-k dielectrics for high-resolution displays. Low temperature processable polysilazanes are another material group in an advanced stage of qualification as barrier coating on plastic substrate or as thin film barrier layers for OLED displays and lighting applications. They protect devices from moisture and oxidation. Merck KGaA, Darmstadt, Germany, is



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targeting innovations to improve image quality and energy savings and is developing materials for lightweight, flexible and robust displays. Both polysiloxanes and polysilazanes are potentially useful for these improvements and new applications. A key advantage of these materials is that they can be used in wet processing, which can simplify the production process and reduce production costs.

OLED materials enjoy strong demand

The comparatively young OLED technology continues to take hold in the market. OLED displays feature brilliant colors, extremely short switching times and high contrast in conjunction with very low energy consumption. In addition to the technical advantages, they are creating new design possibilities: thin, lightweight, flexible and even transparent. OLEDs are also successfully entering the lighting market. The extremely thin and flat light modules are inspiring lighting designers and architects. Under the livlux® brand name, Merck KGaA, Darmstadt, Germany, offers products for electron and hole transport, matrix materials, and emitters for evaporation and printing processes. Merck KGaA, Darmstadt, Germany, is investing substantially in research, development and state-of-the-art production facilities in order to meet its customers' high requirements.

High market potential expected for quantum materials

Quantum materials are semiconducting nanocrystals based on quantum rods. The materials co-developed with Qlight Nanotech offer an enhanced color spectrum with high color quality and purity. Due to their ability to emit polarized light, they can achieve a remarkable increase in brightness and a drastic reduction in power consumption. This enables ultra-bright displays with a wide color gamut. Further development can progress rapidly thanks to the expertise of Merck KGaA, Darmstadt, Germany, in the production of ultrapure materials and the expanded know-how gained through the integration of AZ Electronic Materials. Market launches of the first applications are expected in 2016.

LED phosphors with lower phosphor consumption and improved brightness

The isiphor® brand offers energy-efficient, high-quality phosphors for liquid crystal display backlighting as well as for LED lighting applications. Merck KGaA, Darmstadt,



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Germany, will present the latest generation of lutetium garnets at the trade show. They have improved, narrowband particle size distribution, which both decreases phosphor consumption and improves brightness (more lumens per watt). The “quantum efficiency” used as a measured variable was increased by 4% to 98% from the first generation of lutetium garnets to the current third generation. A significant advantage for LED manufacturers is that they can produce more LEDs meeting the desired specification and thus boost their production yields.

Liquid crystals for new applications beyond displays

Merck KGaA, Darmstadt, Germany, is developing new fields of applications with new technologies for switchable windows as well as smart antenna and headlight systems. The Liquid Crystal Window (LCW) technology ensures that windows can be switched in just seconds from light to dark and vice versa. Various options with regard to coloring create new prospects for the architectural design of windows and facades. In addition to continuously dimmable windows, there now exist prototypes with different zones and touch functions that can be switched individually and viewed at our booth. As a leading materials supplier, Merck KGaA, Darmstadt, Germany, is developing this technology together with partners from the glass, window and facade industry. In April 2015, a pilot version was installed in the Innovation Center at the company’s headquarters in Darmstadt. It shows 100 square meters of liquid crystals windows under actual operating conditions. The innovation, which is to be marketed under the licrivision™ brand, will be able to optimize sunlight and thermal radiation impinging on glazed surfaces in the future, thereby conserving significant amounts of energy.

At the international symposium held during SID Display Week, Merck KGaA, Darmstadt, Germany, will be presenting its latest research and development successes in various informative lectures:

- [SID Business Conference](#): Dr. Roman Maisch, Merck KGaA, Darmstadt, Materials Drive Innovation and Enable New Applications, Monday, June 1, 1:50 – 3:30 p.m.
- Session 08.1: Invited Paper: Alignment of Quantum Rods, Dr. Masaki Hasegawa, Merck, Ltd., Japan, Tuesday, June 2, 10:50 a.m. – 12:10 p.m., Room LL20EF



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- Session 8.2: Semiconductor Quantum Rods for Display Applications, Ehud Shaviv, Qlight Nanotech, Ltd., Jerusalem, Israel, Tuesday, June 2, 10:50 a.m. – 12:10 p.m., Room LL20EF
- Session 23.1: Invited Paper: Colloidal Dispersion Materials for Electrophoretic Displays and Beyond, Dr. Mark Goulding, Merck Chemicals, Ltd., Southampton, UK, Wednesday, June 3, 9:00 – 10:20 a.m., Room LL20A
- Session 27.1: Invited Paper: Liquid Crystal Mixtures for Creating Polymer Walls in LCDs, Dr. Nils Greinert, Merck KGaA, Darmstadt, Germany, Wednesday, June 3, 10:40 a.m. – 12:10 p.m., Ballroom 220B
- Session 43.1: Invited Paper: UB-FFS: New Materials for Advanced Mobile Applications, Dr. Martin Engel, Merck KGaA, Darmstadt, Germany, Thursday, June 4, 9:00 – 10:20 a.m., Room LL20D
- Session 55.1: Invited Paper: Liquid Crystals for Smart Antennas and Other Microwave Applications, Dr. Michael Wittek, Merck KGaA, Darmstadt, Germany, Thursday, June 4, 1:30 – 2:50 p.m., Room LL20D

All events will take place at the San Jose Convention Center.

Visitors to the 2015 SID Display Week can find the company at booth 224.

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