Press release

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Achieving miniaturization success – also with micro LEDs

As LEDs continue to shrink in size, there is a need for materials that dissipate heat quickly and solutions to ensure the effective electrical connection of micro LEDs. At the International LED professional Symposium 2018, Heraeus shows how this can be achieved

It is a major trend. Light-emitting diodes (LEDs) are becoming ever smaller. “This opens up entirely new possibilities for fitting LEDs even more closely together, which is particularly advantageous for applications requiring high luminance,” explains Stefan Mausner, Segment Marketing Manager at the 2018 International LED professional Symposium (LpS) in Bregenz *(see interview)*. Examples include vehicle headlights and UV LED modules, which contain very tightly packed LEDs for exceptional brightness and high energy density.

Technical challenges with micro LEDs

“This progressive miniaturization, however, also brings with it a number of technical challenges, which must not be underestimated,” Mausner stressed during the 2018 LpS in Bregenz. The specific question facing manufacturers is how to successfully connect micro LEDs, which can have an edge length of less than 150 µm, successfully connected electrically when standard solder materials are no longer suitable?

Sinter paste for effective heat dissipation

Heat can be transported from the LED chip to the ceramic or metal substrate via the die-attach material, which connects the chip. Heraeus has specially developed a sinter paste for LED applications, which has a thermal conductivity value twice as high as gold-tin or tin-silver alloys. The heat loss can therefore be dissipated much faster, resulting in higher luminous efficacy and ultimately protecting the LED chip from damage.

Ultra-fine solder pastes for electrical connection

Extremely fine materials are required to electrically connect the micro LEDs on the backplane, as micro LEDs can have an edge length of less than 150 µm. Conventional solder pastes, with particle sizes of between 20 and 45 µm, cannot meet the bond line thickness and stencil opening requirements, meaning that solder alloys with a particle size of less than 11 µm are called for. Heraeus WS5112 type 7 solder paste, made with patented Welco solder powder, allows the printing of tiny solder bumps of up to 50 µm.

“Our products are used in every fifth LED in lamps or lights worldwide”

In this interview, Stefan Mausner, LED expert at Heraeus Electronics, discusses the future development of the LED market as well as major trends

Mr. Mausner, how will the LED market develop in the future?

Micro LEDs are already a major trend, and this is set to continue. Take televisions as an example: OLED TVs have so far been leading the field in

performance. Micro LED displays could offer equivalent performance – coupled with greater cost effectiveness, higher yield, and a longer life. This is why all major manufacturers are currently investing heavily in this technology.

Are there any genuine alternatives to LEDs?
The EU Commission recently introduced legislation banning halogen lamps. Halogen lamps produce 20 lumens per watt, while basic LED lamps already produce a significantly higher 100 lumens per watt. Some LED components are now able to produce much more than 200 lumens per watt – making them considerably more efficient. The logical step, therefore, was to remove the halogen lamp from the market. The future lies in the LED – and the micro LED in particular.

And Heraeus already has a strong presence on the LED market?
We currently hold more than 20 percent of the market share for bonding wire within the global LED market, for example. This means that Heraeus bonding wire is found in every fifth LED that is fitted in lamps or lighting around the world. We are also well represented on the solder paste market. LED applications for sinter pastes are currently becoming another key trend on account of their excellent heat conductivity – a property that is very much in demand in the field of LED packaging due to the high energy densities involved.

About Stefan Mausner
Stefan Mausner has been in the Marketing segment manager LED at Heraeus Electronics. He is responsible for creating sales and marketing strategies in the area of LED and market launches of LED-related products.

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