Novaled Develops World's Most Power-Efficient Fluorescent White Pin OLEDs

Novaled today announced it has developed the world’s most power-efficient fluorescent white OLED structures – achieving 36 lumen per Watt (36lm/W). Using its proprietary organic materials and a new flat light outcoupling method of extraction, Novaled increased OLED device light emission by more than 80-percent, with good color rendering, and also improved the angular dependence of the light emitted.

Novaled’s new power-efficient fluorescent white PIN OLEDs® result in lower manufacturing costs and meet the standards for commercial lighting applications, making them ideal for OLED lamps and luminaires for general and design lighting. Thus Novaled’s efficiency enhancements move OLED technology a step closer to becoming practical for widespread use in lighting applications for the mass market. Novaled will showcase its new technology in Booth #927-4 of the German Pavilion at the Society for Information Display’s (SID) annual International Symposium, Seminar & Exhibition, “Display Week 2011,” May 17-19, 2011, at the Los Angeles Convention Center, Los Angeles; it also will present two papers there on May 20, 2011, on its enhanced outcoupling methods and materials, and on materials for hybrid OLEDs in display applications.

According to Novaled Chief Executive Officer Gildas Sorin, “Until now, typical outcoupling methods have been somewhat ineffective or have resulted in rising manufacturing costs. Novaled has overcome both challenges – pioneering a novel way to significantly improve light outcoupling results and boost external quantum efficiency by more than 80 percent, without the costly and time-consuming setup traditionally required for complex manufacturing. Novaled is a well recognized materials provider for OLED and other organic electronic applications. We will continue to use our expertise to develop leading-edge solutions that help advance OLED technology toward widespread use for mass-manufactured lighting applications.”

Effective Outcoupling, Better Light Quality

Novaled’s novel methods boost outcoupling effectiveness, substantially increasing the 25-35 percent fraction of generated light that typically leaves the OLED device for lighting applications. They also increase power efficiency and quantum efficiency in both bottom- and top-emission OLEDs. In bottom-emission OLEDs Novaled incorporates the material NET61 directly inside the electron transport layers. The combination of NET61 internal outcoupling and an external micro lens array (MLA) film boosts power efficiency by more than 70-percent and quantum efficiency by more than 80-percent. In top-emission OLEDs, Novaled uses scattering material NLE17 on top of the semi-transparent top electrode to help extract light and improve the quality of light emitted from top-emission white OLED devices.

Novaled’s new outcoupling techniques use standard processes to produce the white PIN OLED device structures, thus reducing manufacturing costs for both bottom-emission and top-emission OLEDs. Unlike other outcoupling enhancement approaches in bottom-emission OLEDs – such as depositing complicated structured layers between substrate glass and the indium tin oxide (ITO) anode – Novaled uses simple internal outcoupling methods with vacuum evaporation processed organic materials to induce scattering of the light emitted by the OLED. In both bottom- and top-emission OLEDs, the scattering does not negatively impact electrical properties.

In addition, Novaled’s new method improves the Color Rendering Index (CRI) value for top-emission OLEDs on metal substrates. Although top-emission samples on metal substrates with a white light emission typically have stronger cavity effects than bottom-emission devices and show strong variations with the viewing angle, Novaled increases light extraction from top-emission white OLEDs and strongly reduces angular color dependence by using a scattering evaporation processed organic layer on top of the semi-transparent top electrode. Novaled’s demonstrated CRI of 75 for top-emission OLEDs is ample for many commercial lighting applications.

About OLEDs

OLEDs (organic light-emitting diodes) are semiconductors made of thin organic material layers only a few hundred nanometers thick. They emit light in a diffuse way to form an area light source. In the fast-growing display market, OLEDs are a key part of the dream of paper-thin, highly efficient displays with brilliant colors and maximum design flexibility. OLEDs represent the future of a vast array of completely new lighting applications. By combining color with shape, organic LEDs will create a new way of decorating and personalizing personal surroundings with light.