DISPLAY TECHNOLOGY

Organic LEDs stack up

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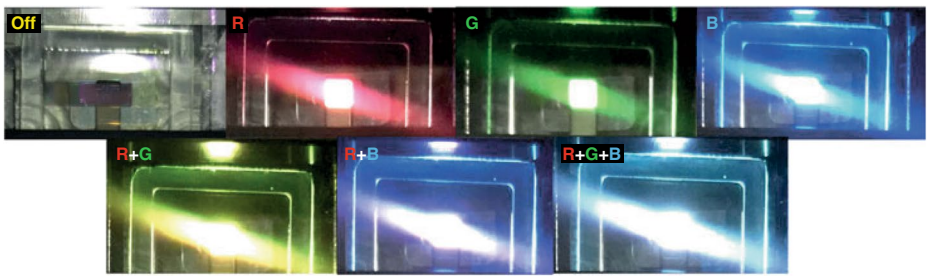

Credit: Springer Nature Ltd

Organic light-emitting diodes (OLEDs) have seen commercial success across a range of display applications, from smartphones to large televisions. The pixels in these displays consist of three red, green and blue (RGB) OLED sub-pixels placed side-by-side. This lateral layout, however, restricts the number of full pixels and how much light can be emitted per unit area, which in turn limits the use of OLEDs in high-resolution and energy-efficient applications such as virtual-reality headsets. Hyunkoo Lee and colleagues have now developed a method to create vertically stacked single-pixel OLEDs, consisting of separate RGB units.

The researchers — who are based at ETRI, KAIST and Sookmyung Women's University in the Republic of Korea — used alumina (Al_2O_3) encapsulation and silicon nitride (SiN_x) passivation layers to protect each underlying OLED during subsequent photolithography processes. Indium zinc oxide intermediate electrodes with linewidths of 10 μm were fabricated to demonstrate the potential of the approach for high-resolution applications. Each stacked RGB unit could then be individually driven by thin-film transistors, providing full-colour emission with a colour gamut of around 112.7% and luminance levels suitable for display applications.

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