A brighter, cheaper blue

Petri Murto

A team of researchers has found a new way to simplify the structure of high efficiency blue organic light-emitting diodes (OLEDs), which could lead to longer-lasting and higher definition television screens.

OLEDs are a class of organic electronics that are already found commercially in smartphones and displays and can make energy generation and consumption more efficient. Although OLED television screens have vivid picture quality, they have certain drawbacks such as high cost, high energy use and comparatively short lifespans.

In a paper published in *Nature Materials*, the researchers from the universities of Cambridge, Imperial, Loughborough and Northumbria describe a new design which overcomes these issues and may lead to simpler, less costly systems with purer and more stable blue light.

The blue OLED problem

Screen pixels are composed of three different coloured subpixels – red, green and blue – that light up at different intensities to create different colours. However, the subpixels that emit blue light are the least stable and can be susceptible to screen "burn-in," which can discolour the screen and ruin viewing quality.

Although some progress has been made to optimise blue OLEDs this new discovery is simpler, more stable and less expensive.

"OLED screens have great picture quality and carry a high premium. However, OLED TVs don't last as long as other screens. Pixels that emit blue light are essential for a practical display but are also where the problems lie," says Dr Daniel Congrave, who recently completed a Herchel Smith Fellowship in organic chemistry, and is now an independent researcher working in Professor Hugo Bronstein's research group.

An OLED sandwich

An OLED is built like a sandwich with organic semiconductor layers between two electrodes. In the middle of the stack is the emissive layer, which lights up when powered with electricity. Electrical energy goes into the molecules in a process called excitation. The excited molecules then release this extra energy as light.

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A solution of the new molecule glowing under UV light.