Press Cuttings

MICROLEDS

Miniature LEDs line up in giant array

By Jacqueline Hewett

Researchers at Strathclyde University's Institute of Photonics in the UK claim to have fabricated the world's largest array of gallium nitride microLEDs.

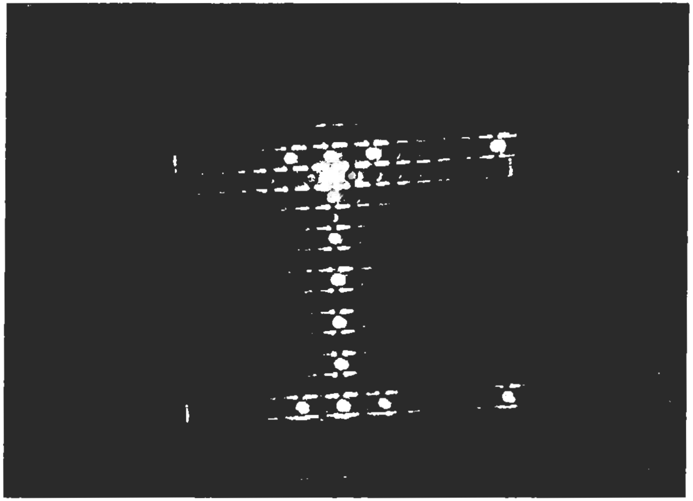
The record-breaking grid contains 12 288 20 µm-diameter emitters arranged in a 128 × 96 array measuring 3.5 × 2.5 mm. The team says that these arrays will be useful in microdisplays and optical biochips for efficient DNA analysis.

As well as being less than one-twenty-fifth of the size of conventional LEDs, microLEDs also offer several benefits over their larger counterparts, claims project leader Martin Dawson. "They are more efficient and have operating speeds of a few hundred picoseconds," he said. "The array is also a multi-element device where you can control the emitters independently. Conventional LEDs use single-element-emitter technology."

The team processes epitaxial multilayer wafers to make the emitters. "We use photolithography and a form of dry etching called inductively coupled plasma etching to pattern the wafer," Dawson told *OLE*.

"A mask allows us to pattern more than one array on each wafer. We use laser micromachining to separate the arrays."

Dawson says that this approach produces high-power, efficient emitters. Current power levels are at about 0.1 mW per element with an operating voltage of approximately 3.5 V.



Institute of Photonics

Bigger than ever: arrays of microLEDs, such as Strathclyde's record-breaking grid of blue emitters, are useful for fluorescence analysis of DNA and making microdisplays.

To date, the researchers have made arrays that emit blue light at 470 nm and are now exploring practical applications. The team has made a prototype alphanumeric monochrome microdisplay.

According to Dawson, there is the potential to extend this to full colour operation by adding a polymer or phosphor material on top of selected elements to shift their emission wavelength.

The team is also using this technology to excite organic materials that have been tagged with fluorescent markers. "Potentially, this is a compact and quick way to analyse multiple DNA samples," said Dawson. "Instead of scanning one laser source over the samples, you can use a 2D multi-element emitter source to read the information simultaneously."

Dawson and colleagues are now developing 370 nm (violet) and 540 nm (green) devices. They hope to commercialize their technology in two to three years.