

Polymer Microlenses Added to Micropixelated UV LED

Proposed applications of LEDs having micron-scale pixel elements include microdisplays and biological and chemical sensors. Now scientists at the University of Strathclyde in Glasgow, UK, have integrated a microlens array and a matrix-addressable, 368-nm micropixelated LED to demonstrate the suitability of such devices for maskless photolithography, in which the programmable emission pattern of the exposure system would produce the desired pattern on a photoresist.

In previous experiments with a bare-chip AlInGaN LED with a 64×64 -pixel structure, the scientists

found that the beam divergence from each microemitter was too high to offer the desired resolution for photolithographic exposure. They thus quantified this divergence and designed a microlens array that would collimate the output.

Using spin-coating, photolithographic patterning and reactive-ion etching, they fabricated an array of 23- μm -diameter, 8.4- μm -high spherical lenses of UV-curable adhesive over the micropixels, which were spaced by 30 μm . The resulting beams were 8 μm in diameter and remained well collimated over a distance of 500 μm .

A test of the micropixelated LED

for maskless photolithography demonstrated that it could produce features 7 μm in diameter in a photoresist, opening the way to a variety of direct-writing applications and to the self-aligned fabrication of micro-optical elements.

The work is part of a larger project funded by the Basic Technology Research Programme of Research Councils UK to explore micropixelated LEDs for microscopy, biosensing, direct writing and hybrid organic/inorganic optoelectronics. \square

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