Maskless Photolithography for Customization

By

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Lumarray has developed a maskless-photolithography system, the ZP-150, based on zone-plate-array lithography (ZPAL). It employs an array of 1000 diffractive-optical lenses to focus light from a spatial-light modulator (SLM) into on-axis focal spots. By scanning the stage across the entire substrate, while controlling the light level to each focal spot, patterns of arbitrary geometry are written in a dot-matrix fashion. In contrast to other maskless-lithography approaches, the ZPAL architecture lends itself to straightforward enhancements in thruput, resolution, precision, overlay, 3D structuring and non-planar substrates. For thruput enhancement, the number of lenses or the SLM data rate can be increased. For resolution enhancement, the wavelength can be reduced or methods such as AMOL employed. Precision and overlay can be enhanced via software. 3D structuring and non-planar surfaces can be addressed with special diffractive-optical lenses. The design choices, current performance, future plans and the application space for Lumarray's systems will be described.