

Fabrication of Three-Dimensional Structures by Image Processing

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In this paper, we propose a novel lithography technique for fabricating three-dimensional (3D) structures by applying image processing, which markedly reduces prototyping effort and time, and allows high flexibility for design. We employed two types of lithography techniques that are compatible with image processing: gray-scale lithography and binary optics technique. The former provides high flexibility to 3D figuration of photoresist with only a single exposure step using a special photomask: gray-scale mask. The latter requires several exposure steps, but provides high controllability of resist height and low surface roughness. We prototyped several structures such as a Fresnel lens profile using two types of photoresists: AZ-p4620 and SU-8. In particular, SU-8 allowed distinctly tall 3D structures with high aspect figures.

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