

Single-Step Production of 3D microstructures through Reaction-Diffusion-Mediated
Photolithography

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General photolithographic methods are optimized to fabricate 2D microstructures. In contrast, Reaction diffusion photolithography (RDP) technique can fabricate 3D microstructures and overcome limitation of general photolithography. RDP which focuses on oxygen concentration is a radical polymerization with 3 steps—initiation, propagation, and termination, and oxygen reacts with radicals first and thus plays an important role as inhibitor.

Microstructures designed by RDP depend on Damkohler number which contains oxygen diffusion and oxygen depletion terms. Previous research fabricated microstructures by only controlling their size, which can only result in one shape in a specific size. Here, we suggest controlling the photo-initiator (PI) concentration so that it can design variety shapes in specific size. Also, we analyzed the mechanism of photocuring with PI concentration in oxygen diffusion term of Damkolher number.