Tohoku Univ. Technology

Optical nanoimprinting method that enables a uniform residual layer without burr generation at mold edge

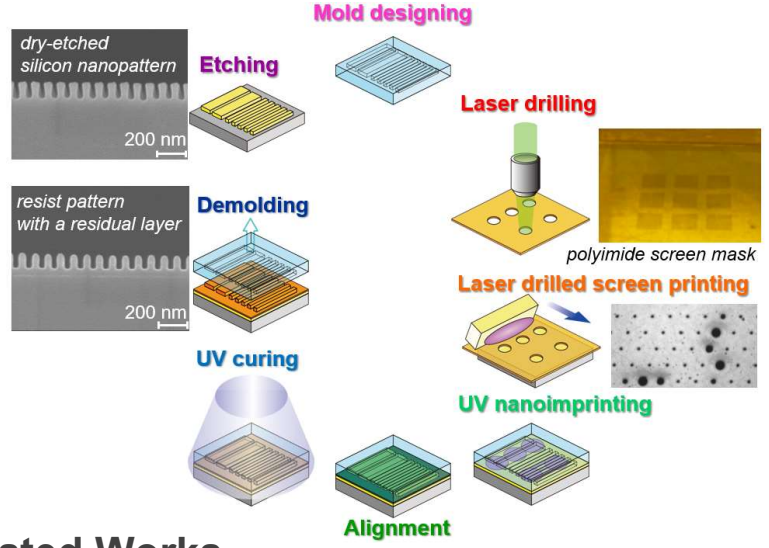
Precise manufacture of complicated structure with sparse/dense micro/nano-patterns!

UV-NIL @ Nakagawa G

Overview

Ultraviolet nanoimprint lithography (UV-NIL) have attracted attention as an industrially acceptable nanofabrication technology from views of cost and throughput; However, the use of spincoated films of photo-curable resin on substrates causes the problems of burr generation arising from mold edges and unleveled residual layers arising from site-selective differences in pattern densities of mold surfaces. The problems make subsequent lithography processes impossible. This optical nanoimprinting method consists of micro-scale laser-drilled screen printing and nano-scale molding. High-viscosity photo-curable resins with 1-300 Pa·s can be placed by screen printing using a polyimide sheet having through poles which are fabricated by laser drilling using a picosecond pulsed laser. The minimum volume of a printed droplet is 5 fL (10^{-15} L). The resist patterns and resultant silicon patterns with 45-nm-linewidths are fabricated.

Nanofabrication by laser-drilled screen printing



Product Application

Optics: microlens array, polarizer, antireflection surface, metalens
Electronics: metal/semiconductor/insulator patterning, built-up devices
Bio applications: culture sheet, nano/micro fluidic device

Related Works

1. *Jpn. J. Appl. Phys.*, **2016**, *55*, 06GM01
2. *J. Vac. Sci. Technol. B*, **2016**, *34*, 06K404
3. *J. Vac. Sci. Technol. B*, **2017**, *35*, 06G301
4. *Bull. Chem. Soc. Jpn.*, **2018**, *91, 178*

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