

Challenge of Evanescent Light Exposing Microstereolithography

RCAST, The Univ. of Tokyo, °Satoru Takahashi

E-mail: takahashi@nanolab.t.u-tokyo.ac.jp

We have proposed an application of evanescent light to one-shot layer-by-layer microstereolithography as an exposure energy [1]. A solid immersion lens (SIL) is used as both a high-power imaging tool and a high-refractive-index material for total internal reflection (TIR) (**Fig. 1**). Under this condition, evanescent light exposure can be performed when light with an incident angle smaller than that critical angle is blocked from reaching the surface. A vertical process resolution, which directly depend on the vertical localization of the evanescent light itself, is expected as the order of 100 nm. Furthermore, an improvement of lateral process resolution can be also expected due to a high-power imaging of SIL. We have experimentally confirmed that a sub- μm -cured-layer-thickness by evanescent light can be achieved (**Fig. 2**) [2] and that an evanescent light exposing layer can be laminated for layer-by-layer microstereolithography.

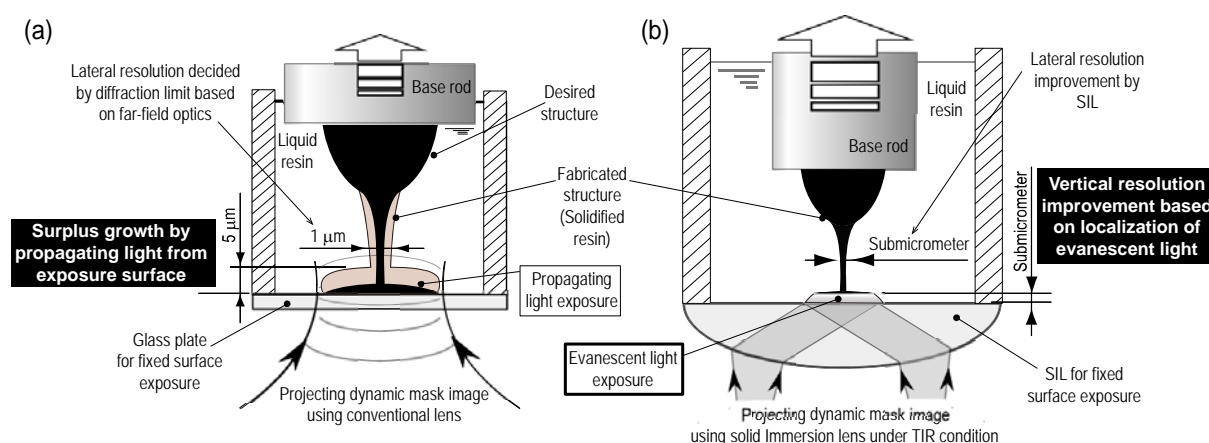


Fig. 1: One-shot layer-by-layer microstereolithography using propagating light (a) and evanescent light.

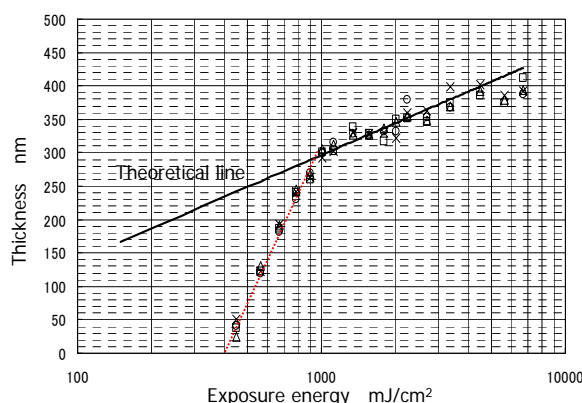


Fig. 2: Experimentally measured cured layer thickness against exposure energy.

References:

- [1] S. Takahashi, Y. Kajihara, K. Takamasu, *CIRP Annals*, 61, 1(2011).
- [2] Y. Kajihara, Y. Inazuki, T. Takeuchi, S. Takahashi, K. Takamasu, *Appl. Phys. Lett.*, 92, 093120 (2008).