

동적 마스크 리소그래피를 이용한 하이드로젤 국소 패터닝 기법과 캔틸레버 제작

Local hydrogel patterning and microcantilever fabrication using dynamic mask lithography

이정철*·이일*

Jungchul Lee and Il Lee

Key Words : Dynamic Mask(동적 마스크), Hydrogel(하이드로젤), Microcantilever(미소외팔보), Photolithography(광경화)

ABSTRACT

We report a new method for highly controllable local patterning of a hydrogel on microfabricated cantilevers and fabrication of all hydrogel microcantilevers. We constructed a dynamic mask based photolithography setup using a commercial beam projector, a 3-axis microstage and other optical components. Dynamic masks generated from the beam projector controlled the shape, size, and position of hydrogel patterns while the 3-axis microstage mainly controlled the thickness of hydrogel patterns and hydrogel microcantilevers. Using the constructed setup, polyethyleneglycol diacrylate (PEGDA) was patterned on microfabricated cantilevers in a highly controlled manner. Currently, the smallest PEGDA patternable is a 5- μ m-diameter circle with a thickness of ~ 10 μ m. To confirm thicknesses of patterned PEGDAs on silicon microcantilevers, resonance frequencies of microcantilevers were measured before and after each PEGDA patterning. Thicknesses extracted from resonance measurements showed good agreement with measurements using an optical microscope. In addition, PEGDA microcantilevers with various dimensions and thicknesses were fabricated on glass and silicon substrates. Surfaces of fabricated all hydrogel microcantilevers were flat enough to facilitate other post processing and to be used for various sensing applications.