

## 2단계 모세관 리소그래피 기술을 이용한 마이크로/나노스케일 복합 구조의 제조 및 표면 특성 분석

서갑양<sup>†</sup> · 정훈의 · 이성훈 · 김재관(서울대)

### Fabrication of multiscale hierarchical structures by two-step temperature-directed capillary lithography

Hoon Eui Jeong, Sung Hun Lee, Jae Kwan Kim and Kahp Yang Suh

**Key Words:** micro/nano hierarchical structure (마이크로/나노 병합구조), capillary lithography (모세관 리소그래피), hydrophobicity (소수성), contact angle (접촉각)

**Abstract :** In this paper, a simple method for fabricating micro/nanoscale combined hierarchical structures is presented using a two-step temperature-directed capillary molding technique. This lithographic method consists of two steps: (i) fabrication of polymer microstructures using a PDMS mold and (ii) subsequent nanofabrication using a high-resolution polyurethane acrylate (PUA) mold on top of the pre-formed microstructures. The resulting micro/nano combined structures were robust and demonstrated enhanced water-repellent properties by coexistence of homogeneous and heterogeneous wettings, as confirmed by contact angle measurement of water. An analytical model was suggested to explain our experimental observations and shows a good agreement with the experimental results.

## 나노임프린트 리소그래피 공정에서의 폴리머 변형 해석

손지원<sup>†</sup>(서울대) · 오수익<sup>\*</sup>(서울대)

### Simulation of polymer deformation in nanoimprint lithography

Ji-Won Son and Soo-Ik Oh

**Key Words:** nanoimprint lithography(나노임프린트 리소그래피), surface tension(표면 장력), dynamic contact angle(동적 접촉각), slip length, PMMA

**Abstract :** Numerical simulations are carried out to understand the deformation process of thin polymer (PMMA) film in nanoimprint lithography. Deformation of a thin polymer above its glass transition temperature is studied for various imprinting conditions such as the aspect ratios of a mold pattern, and imprinting velocity. And, the difference of the thermal expansion coefficients between the mold and the substrate causes strain, and relationship between the strain concentration and defects in the pattern is studied.