

A study on Optical/Electrical properties of Sb_{100-x}Se_x Thin Films

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PRAM is one of the most promising candidates for new-generation nonvolatile memory devices. However, such applications still demand advanced materials to guarantee high speed, low power consumption and reliability of device, which could be realized by control of phase transition behaviors such as rapid crystallization, easy amorphization, and reinforced phase stability of phase change materials.

In this study, the structural transformation, electrical/optical switching properties of Sb_{100-x}Se_x thin films were studied to optimize phase change materials.

Sb_{100-x}Se_x thin films were deposited on Si(100) wafer and slide glass by RF magnetron co-sputtering system and phase change characteristics were analyzed by X-ray diffractometer, 4-point probe measurement and static tester. In optimum composition, the crystallization time was below 20ns by pulsed laser irradiation, and it was accelerated by re-crystallization process. The sheet resistance different was higher than $10^4 \Omega/\square$ upon phase transition. The crystallization temperature and minimum time for crystallization of Sb_{100-x}Se_x thin films were increased as the amount of Se increased, which correlated with activation energy for crystallization.

Keywords: phase change RAM, glass semiconductor

Nanosphere Lithography(NSL)를 이용한 Si master제작 Fabrication of Si master by Nanosphere Lithography

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NSL 공정 기술은 차세대 나노 패터닝 공정기술 중 하나로 매우 낮은 가격과 높은 효율 뿐만 아니라 빠른 공정 시간과 대량 생산의 가능성으로 주목을 받고 있다.

시편의 준비는 15mm×15mm 사이즈의 Si기판을 사용하였다. Si표면을 친수성 표면으로 만들기 위하여 H₂SO₄:H₂O₂(3:1)용액에 2시간 동안 담근 후 NH₄OH:H₂O₂:H₂O(1:2:6) 용액에 15min, SDS(Sodium Dodecyl Sulfate)용액에 24h동안 세척과정을 거쳤다.

나노스피어 코팅방법은 Spin coating, Drop coating법을 이용하였다. Spin coating법은 350μl의 나노스피어를 Si 기판에 떨어뜨린 후 1step: 400rpm/5sec, 2step: 800rpm/120sec, 3step: 1400rpm/10sec 으로 실험이 진행되었고, Drop coating법은 100μl의 나노스피어를 비스듬히 세워진 기판에 떨어뜨려 코팅을 하였다.

이를 SEM(Scanning Electron Microscope)을 이용하여 분석한 결과 Spin coating법 보다 Drop coating법이 nanosphere가 uniform하게 coating이 된 것을 확인하였다.

이 연구에서는 Drop coating법으로 나노스피어를 코팅하여 Ashing 공정과 RIE공정을 거쳐 나노사이즈의 Si master를 제작하였다.

Keywords: Nanosphere Lithography, Sodium Dodecyl Sulfate