

## Fabrications of Si-based nanostructures prepared by electrochemical processing

이정호<sup>†</sup>

한양대학교 재료화학공학부  
(jungho@hanyang.ac.kr<sup>†</sup>)

A variety of periodically-patterned-nanostructure arrays such as nanopillars, nanocones, squared walls, pyramids, truncated pyramids was fabricated using electrochemical etching processes which were combined with top-down optical lithography. Basic principles and their potential applications are also briefly covered.

**Keywords:** electrochemical etching, silicon nanostructure, nanowire

## 프로브 기반 나노 정보 저장 장치에 쓰이는 열-압전 캔틸레버와 CMOS 웨이퍼와의 집적화 단계에서 발생하는 PZT 열화에 대한 연구

이선영<sup>†</sup>

한양대학교 재료 화학공학부  
(sunyonglee@hanyang.ac.kr<sup>†</sup>)

Recently, there have been many efforts to use piezoelectric thin film as sensors or actuators to be applied in the field of high-speed AFM (Atomic Force Microscopy) and nano data storage. In this paper, Lead Zirconate Titanate (PZT) degradation during wafer level bonding of thermo-piezoelectric cantilevers with CMOS-wafer was investigated for the application of nano data storage system. It was found that polyimide film which serves as a height adjustment during wafer level bonding between cantilevers and CMOS-wafer caused significant damage in PZT sensor when polyimide was coated entirely on the PZT capacitor followed by heating to 300 °C for bonding process. FTIR (Fourier Transform Infrared Spectroscopy) was used to analyze the reaction product that caused PZT capacitor damage. It was found that NH<sub>2</sub> or NH<sub>3</sub><sup>+</sup> peaks from the sample with Polyimide exposed PZT capacitor were found and these peaks were not detected on a sample with PZT capacitor or on a polyimide coated sample only. These hydrogen ions contained in NH<sub>2</sub> or NH<sub>3</sub> stretch during heating can lead to hydrogen atmosphere annealing which can attack PZT significantly. With polyimide being hydrogen-rich, Pt served as an active catalyst to decompose H<sub>2</sub> molecule to atomic hydrogen during bonding process. However, for the sample with Polyimide coating only on top electrode, degradation was minimized. Therefore, PZT damage was minimized successfully by optimizing polyimide coated area during integration.

**Keywords:** 열-압전 캔틸레버, polyimide, PZT degradation