

# Fabrication of Surface Micromachined Microstructures Using SOI Structures with Buried Cavities and DRIE

Gwiy-Sang Chung and Jae-Min Kim

School of Information System Engineering, Dongseo University, San 69-1,  
Churye-Dong, Sasang-Ku, Busan 617-716, Korea

(Received March 19, 2003; accepted September 10, 2003)

**Key words:** SOI with buried cavities, SDB, electrochemical etch-stop, DRIE, MEMS

This paper describes the fabrication of Si-on-insulator (SOI) structures with buried cavities using Si-wafer direct bonding (SDB) and electrochemical etch-stop, and their application to surface micromachined microstructures by deep reactive ion etching (DRIE), which is suitable for thick membranes, cantilevers, and three-dimensional microstructures with good thickness, uniformity, flatness and single-crystal Si. After a feed-through hole for supplied voltage and buried cavities formed on the handle of a p-type Si wafer, the handle wafer was bonded to active Si wafers consisting of a p-type substrate with an n-type epilayer corresponding to membrane thickness. The bonded pair was then thinned until electrochemical etch-stop occurred at the pn junction during electrochemical etchback. By using the SDB SOI structure with buried cavities, surface micromachined microstructures were fabricated by DRIE. This single-crystal Si surface micromachining process is a powerful and versatile technology for new microelectromechanical systems (MEMS) applications.