

A Test Vehicle for Characterization of Processing Induced Physical Damages on Poly Lines

Bingxi Wood, Engineering/Technology Program Manager,
Man-Ping Cai, Mike Smayling, Raymond Hung, Chorng-Ping Chang,
Yongmei Chen, James Yu, Raj Kanuri
Maydan Technology Center Group, Applied Materials

Abstract

Poly lines with ultra-fine line width are prone to physical damages caused by wet processing. Test wafers with fine poly lines were made to characterize such damages. The test patterns are printed with a specially designed mask, which incorporates many repetitive line patterns of different type, orientation, width/space, and length for easy defect inspection, encompassing a large range of physical design space of sub-100 nm silicon technologies. The full range of poly line patterns are used to systematically characterize device structural damage as a function of processing conditions. By correlating damage and process conditions or equipment design, progress can be made to select best processing window, improve processing equipment, reduce and eliminate damage and improve product yield. The feasibility of this methodology has been demonstrated by characterizing poly line damages due to Megasonics power in wet clean equipment. Such damages are quantified as functions of line width, orientation, space, and processing conditions. Details on special mask design, inspection methodology and results of Megasonics damage on poly lines are presented in this paper. Results shows that these test wafers are very effective test vehicle to quantify process induced physical damage.