Surface Topography Evolution and Fatigue Fracture in Polysilicon MEMS Structures.

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Abstract

This paper presents the results of an experimental study of the micromechanisms of surface topography evolution and fatigue fracture in polysilicon MEMS structures. The initial stages of fatigue are shown to be associated with stress-assisted surface topography evolution and the thickening of SiO2 layers that form on the unpassivated polysilicon surfaces and crack/notch faces. The differences in surface topography and oxide thickness are characterized as functions of fatigue cycling before discussing the micromechanisms of fatigue fracture.