On the evolution of surface morphology of polysilicon MEMS structures during fatigue.

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Abstract

This paper presents the results of a combined experimental and computational study of surface topology evolution preceding fatigue crack nucleation in polysilicon MEMS structures. The evolution in surface topology observed during the crack nucleation stage is related to the underlying notch-tip stress distributions calculated using the finite element method. Measured changes in surface topography due to the stress-assisted dissolution of silica are shown to be predicted by a linear stability analysis. The implications of the results are discussed for modeling of fatigue in polysilicon MEMS structures.