

Nanoscale scratching of platinum thin films using atomic force microscopy
with DLC tips

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Abstract

AFM (atomic force microscopy) scratching is a simple yet versatile material removing technique for micro- and nano-patterning. In this article, AFM scratching experiments were conducted to investigate the scratching characteristics of platinum thin-films for MEMS (MicroElectroMechanical System) applications. The influences of the scratching parameters on the resulting geometries and surfaces were specifically investigated. The scratching parameters considered included the normal applied force, number of scratch cycles, and scratch speed. All results indicated that the scratched groove size could be well correlated with and precisely controlled by the applied force and the scratch cycle number. With the aid of the correlation parameters, the scratchability, which was a measure of the easiness of the material to be removed by scratching, was specifically evaluated and discussed for the Pt thin film.

Keyword : Atomic force microscope/microscopy; MEMS; Machining; Platinum thin-film; Scratching; Scratch cycle number; Threshold force