

Silicon Nitride Cantilevers with Oxidation-sharpened Silicon Tips for Atomic Force Microscopy

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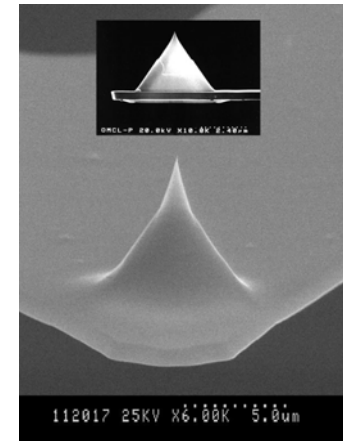
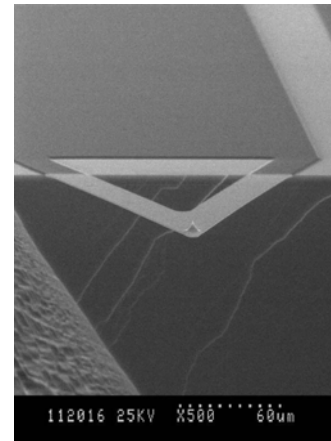
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Abstract

An atomic force microscope cantilever with a low spring constant and a sharp tip can achieve high-resolution imaging of soft or fragile samples. We have devised a novel process for fabricating such cantilevers from silicon and silicon nitride. First, we fabricated and oxidation-sharpened silicon tips on a wafer. Then, we deposited a thin film of silicon nitride over the tips, patterned it to define the cantilevers, and removed it from the tips so that they stuck up through the cantilevers. Finally, we etched from the backside to release the cantilevers without damaging the tips. We characterized the resulting cantilevers using scanning electron microscopy, measurement of their thermal noise spectra, and analysis of the contact-mode images they produced of a test sample. A typical resulting cantilever had a spring constant of 0.06 N/m and a tip radius of 9.2 nm.

SiN/Si Hybrid Cantilever



*Inset: Olympus nitride tip from web site, note --same scale