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Practice quiz Mechanical surface profile measurement

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Questions:

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1. Which of the following samples are suitable for the use of a mechanical surface profilometer?



Hard metallic or ceramic surfaces



Soft organic and inorganic surfaces



Solid polymeric surfaces



Liquid samples



Explanation

Solid surfaces of metals, semiconductors, ceramics or polymers are suitable to be measured by means of a mechanical surface profilometer. Contrarily, mechanical probing of soft materials is less common due to the risk of damages from scratching and in liquid environments capillary forces and damping can distort the measurement.

For further information, please see video "Mechanical surface profile measurement" at 02:07.

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2. Is the mechanical surface profilometry introduced in the video suitable to measure the extent of under cut resulted by an isotropic etching process?

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Yes



No



Explanation

As long as the mask is on top of the etched material, it is not possible to "see" below the mask.

For further information, please see video "Mechanical surface profile measurement" at 02:30.

3. How is the cantilever deflection measured in an AFM?



With a piezo actuator that keeps the cantilever at constant distance from the surface.



With a laser focused onto the backside of the cantilever and a detector that measures the laser beam deflection.



With the linear variable differential transformer (LVDT), which is attached to the cantilever.



Explanation

The cantilever deflection is measured in most commercial AFM by means of a laser that is pointed to the far end of the cantilevers back side. The laser point, mirrored from the lever to the photodetector, displaces synchronously with the deflection of the cantilever. A piezo actuator that keeps the cantilever at a constant distance from the surface would not permit to detect a deflection. LVDTs are used in mechanical surface profilometer to move the probe and detect displacement, however this concept would not work for a scanning probe.

For further information, please see video "Mechanical surface profile measurement" at 04:22.

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