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Practice quiz Optical thin film thickness measurement

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Questions:

0 points possible (ungraded)

1. In optical thin film metrology, which of the following statements are true with regards to the incident angle of light?

☒ Reflectometers and transmittometers operate under normal incidence

☐ Reflectometers and transmittometers operate under inclined incidence

☐ Ellipsometers operate under normal incidence

☒ Ellipsometers operate under inclined incidence



Explanation

Since normal incidence is used, reflectometers and transmittometers can only analyze the intensity of light and ignore the polarization effects because most films are rotationally symmetric. Thus, reflectometers and transmittometers are rather simple and cost effective. On the contrary, ellipsometers use inclined incidence to analyze both the intensity and polarization, which makes it more powerful, sophisticated, and more expensive.

For further information, please see video "Optical thin film thickness measurement" at 02:27 and 04:55.

2. Is it possible to measure the thickness of the following thin film material by either reflectometry or transmittometry?

☐ ZnO

☒ SiO₂

☐ Si

☒ Photoresist

☒ Si₃N₄

☒ Dielectric films

☐ Au



Explanation

For the reflectometer and transmittometer, the thin film material has to be transparent within the wavelength range of light sources, in order to allow the light traveling through the thin film. On the other hand, ellipsometers analyze not just the intensity of light, but also the polarization, which allows it to work on some non-transparent thin film, such as ZnO, Si and Au within a limited thickness range, for instance, under 50 nm. Please see video "Optical thin film thickness measurement" at 02:27 and 04:55.

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