Versatile spectroscopic ellipsometry to characterize various material thin films: Principle and application

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Spectroscopic ellipsometry is a powerful tool to characterize various materials. In this work are presented the principle of this technique (a) and a few examples (b).

a) Ellipsometry measures the polarization of the light reflected from a surface. A linearly polarized light is sent on the sample surface and the reflected light which becomes elliptically polarized is analyzed. From analysis there are obtained 2 independent measurement values in the same time: Ψ the ratio between amplitudes of the parallel and perpendicular polarization states on the plane of incidence, and Δ the phase shift between them.

b) Thin films of TiO_2 and ZnO, obtained by Pulsed Laser Deposition (PLD) technique are analyzed by means of ellipsometry. While the TiO_2 is an isotropic material, the ZnO is a uniaxial material. The models used to analyze the data and the fitting results, e.g. thicknesses, dielectric function, optical band gap and crystalline structure will be presented.

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