AN EFFICIENT WAY TO EXTEND THE DYNAMIC RANGE OF NANO-BIO-CHIP SENSORS IN AUTOMATIC MEASUREMENT

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ABSTRACT: Based on previous studies and works on the development of *OBMorph* (Opto-BioMorphin) system in our group, a newly developed interferometric ellipsometer integrated with a quadrature interferometer was design and constructed for ellipsometry measurement. This paper advanced an efficient way to extend the dynamic range upon angular interrogation and the modulation of equivalent index change on ITO (indium-tin-oxide) film layer caused by the change of surface plasmon coupling as the externally DC and AC voltage applied. Our experimental data showed three times extending of dynamic range was reasonably practicable while compared with the traditional phase detection. The fourth digit order variations of equivalent indices on ITO can be observed and be enough to overcome the lack of dynamic range for point-wise measurement. The significant features of our system are miniaturization, high sensitivity, high resolution (to the fourth digit order), wide dynamic range and real-time monitoring in order to measure the thin-film structure and biomolecular interactions fast and precisely under solid or liquid surroundings. The long-term goal of this work will be on real-time monitoring of thin-film manufactures and clinically biomedical diagnosis.
Keywords: Ellipsometry, Optical metrology, ITO thin layer, Nano-Bio-Sensor.