

# **Development of snapshot polarization interferometer for measurement of wafer surface topography**

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In contemporary semiconductor manufacturing, the paramount factor influencing production quality is the wafer quality itself, dictating the merits and drawbacks of the final product. The evaluation of quality encompasses numerous parameters, with the surface profile standing as a crucial aspect. Real-time assessment of the wafer's surface profile, coupled with swift adjustments to manufacturing parameters, holds the potential to substantially augment wafer yield. This underscores the pivotal role of surface profile measurement in the semiconductor manufacturing process. This study introduces a pioneering approach utilizing a polarization interferometer for the measurement of polished wafer surface profiles. The technique capitalizes on Fizeau-type polarization interferometry, incorporating a polarization camera that enables full-field measurements of the wafer's surface profile. Through the camera, polarization interference patterns are captured from a Fizeau interferometer, yielding four phase-quadrature interference patterns. By applying a phase-shifting algorithm to these patterns, the wafer's surface profile can be accurately ascertained. This novel methodology exhibits exceptional accuracy and reliability in the measurement of wafer surface profiles, rendering it potential applications in modern semiconductor manufacturing. The proposed system has affirmed exceptional efficacy, providing results characterized by precision and accuracy. In contrast to established surface profile measurement techniques, this approach boasts a range of advantages. These include heightened measurement resolution, rapid assessment speed, and the capability for full-field measurements. These attributes the proposed technique as a promising avenue for enhancing quality control and manufacturing efficiency in semiconductor production. The resultant benefits translate into improved performance and heightened competitiveness within the industry.