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Optical interferometric assessment of thin-film adhesion to substrate SUSHOVIT ADHIKARI[1], KENJI GOMI[2], SANICHIRO YOSHIDA, Southeastern Louisiana University — A Michelson interferometer has been assembled to evaluate the adhesion strength of thin-film coating on silicon wafers. Two gold coated silicon wafer specimens are configured as the two end mirrors of the interferometer. The end mirrors are slightly tilted so that vertical interferometric fringes (dark stripes) are formed behind the beam splitter. An acoustic transducer is attached to the silicon substrate of each wafer so that the gold coated surface oscillates in the direction of the optical axis. One wafer is driven at a time. As the coated surface oscillates, the vertical fringes oscillate horizontally, where the amplitude of the oscillation varies depending on the adhesion strength. Two specimens, one with oxygen-plasma pre- coating treatment and the other with no pre-coating treatment, have been tested. Empirically, the former is known to be stronger in adhesion than the latter. When the specimen of the weaker adhesion is driven in a range of 10 – 17 kHz, the fringes become blurry, indicating that displacement is greater. Analysis of the fringe patterns in the spatial frequency domain has enabled us to differentiate the displacement quantitatively.

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