Abstract Submitted
for the SES12 Meeting of
The American Physical Society

Characterization of adhesion mechanism of thin-film systems using two independent, but correlating techniques BISHWAS GHIMIRE, SUSHOVIT ADHIKARI, SANICHIRO YOSHIDA, KONRAD KABZA, Southeastern Louisiana University — Adhesion strength of thin-films to the substrate has been studied using two methods. The first is characterization of dynamic behavior of the film relative to the substrate surface based on an opto-acoustic technique. The thin-film specimen is configured as an end-mirror of a Michelson interferometer, and oscillated from the rear with an acoustic transducer. The resultant film surface displacement relative to the substrate is evaluated from the fringe shift of interference pattern behind the beam splitter. The second is surface energy analysis based on Young's contact angle measurement. Small drops of solutions with various surface tensions are placed on the substrate surface. The contact angle of each drop is measured, and its cosine is plotted as a function of the surface tension. The surface energy of the substrate is estimated through extrapolation of the plot to the zero-surface tension limit. These methods have been applied to pairs of thin-film specimens of the same film (Au, Pt) and substrate material (Si) prepared with different pre-coating surface conditions (plasma-treated and untreated). The two methods show clear correlation indicating that the plasma-treatment strengthens the adhesion.

Bishwas Ghimire
Southeastern Louisiana University

Date submitted: 18 Sep 2012 Electronic form version 1.4