

Rapid Characterization of Surfaces with Thin Films Using Mercury Probe Electrical Testing

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Abstract

As the semiconductor industry continues to implement the ITRS node targets that go beyond 45nm [1], the presence of films on substrates to be patterned, must be well characterized. Applying films as coatings, metal protection, or in cases of their removal, a rapid test for process control, that is sensitive and non-destructive, is needed. One such screening method includes the use of a mercury probe analyzer. Metal passivation may be detected by elevated resistance for an inhibitor mix relative to benzotriazole (BTA) and tolyltriazole (TTA) observed on copper. Demonstration has also occurred in the nanofabrication of magnetic structures where a polymer film is applied to metal plated disks and further processed.[2] In this case, the probe is used to detect the presence or absence of <20nm of ashed polymer. Substrates cleaned with a metal-safe aqueous cleaner, show resistance values similar to the reference metal substrate. Evaluation is conducted using a coaxial Hg dot and ring contact supported by an MDC computerized measurement system with an engineering I-V plotting program.[3] Also presented is the use of the mercury probe as a screening tool to verify removal of thick acrylic negative-tone resists.