

In-situ stress and in-vacuo LEIS surface metrology of ultrathin film growth

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The continuous downscaling of feature sizes in semiconductor manufacturing requires control of the structures with sub-nanometer accuracy. Metrology **during** device manufacturing at the sub-nanometer resolution is becoming critical in order to understand and further optimize such structures,. For Mo/Si based multilayers applied in e.g. EUVL, the initial growth mode of each layer on its underlayer strongly influences the optical performance by e.g. compound formation and developing growth strains. We present recent a recent study of the growth of Mo on Si and Si on Mo, where the growth of the films is studied by in-situ laser deflection, revealing development of growth strains, and in vacuo Low Energy Ion Scattering (LEIS), revealing intermixing and surface segregation. The results reveal that there is a strong correlation between the surface composition of the growing film and the growth strains in the region where a silicide interface is formed. Only after a closed layer is reached, bulk growth strains are observed.