Abstracts

Microwave Scanning Microscopy for Planar Structure Diagnostics

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Microwave scanning microscopy is being developed to detect lateral conductivity variations in semiconductor wafers and to profile dielectric and conducting quasi-planar surfaces. We have utilized three different critically-coupled one-port cavities, with thin-diameter conducting coupling elements providing enhanced lateral sensitivity in microstrip and rectangular waveguide cavities and a circular aperture coupling element in a cylindrical waveguide cavity providing enhanced depth resolution capability. Lateral resolutions on the order of a few roils (0.002 wavelengths) and depth resolutions of a few microns (0.0001 wavelengths) have been achieved with conventional, low-power x-band instrumentation. Lateral resolution measurements of evaporated aluminum/silicon gratings with sheet conductance contrast of 300, ion-implanted n+/n silicon conductivity gratings with sheet conductance contrast of 2 and dielectrically isolated, single-crystal-tub silicon wafers are described. More limited depth profile measurements are presented to illustrate depth resolution capability.

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