

Beam-Based Defect Localization

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This short course reviews SEM (scanning electron microscopy) and SOM (scanning optical microscopy) techniques for IC failure analysis. All of these techniques can be performed on a standard SEM or SOM (using the proper laser wavelengths). The use of advanced electron/optical beam test systems will also be discussed. The goal is to provide beneficial information to both novice and experienced failure analysts. Topics are: 1) Standard techniques: secondary electron imaging for surface topology, backscattered electron imaging, voltage contrast, capacitive coupling voltage contrast, electron beam induced current imaging, and x-ray microanalysis; 2) Specialized SEM techniques: novel voltage contrast applications, resistive contrast imaging, and charge-induced voltage alteration (both high and low energy versions); and 3) SOM techniques: light-induced voltage alteration, thermally-induced voltage alteration/optical beam induced resistance change, Seebeck Effect imaging, soft defect localization/laser-assisted device alteration, laser logic probing, and solid immersion lens applications.