

MAG*I*CAL

Traceable Transmission Electron Microscopy Calibration Sample

This unique calibration sample is directly traceable to the crystal lattice constant of silicon and can be used to perform the three major instrument calibrations in all Transmission Electron Microscopes (TEMs):

- Image magnification at all magnification ranges
- Camera constant
- Image/diffraction pattern rotation calibrations

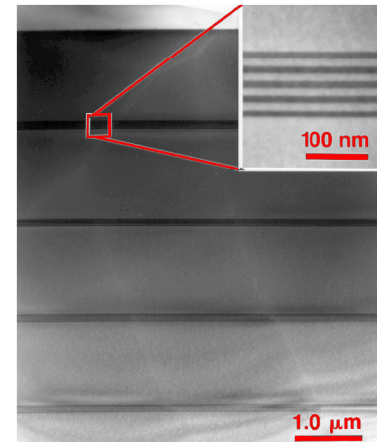


Fig. 1: TEM micrograph of the MAG*I*CAL®. Four identical structures are found at each of the four locations shown by arrows in Fig. 2.

APPLICATION

The magnification calibration is the most common calibration in the electron microscopy, since it is important to know if the magnification value on the microscope console or on the image is accurate, if not how to correct the value. With the unique MAG*I*CAL calibration sample you can perform this calibration in the entire range of magnification in a TEM from about 1000x up to 1,000,000x. Since the sample itself is a single crystal, it can also be used to perform camera constant calibration and also image/diffraction pattern rotation calibration. Although the MAG*I*CAL calibration sample was developed by materials scientist, life scientists doing TEM will find the use of MAG*I*CAL to be equally useful

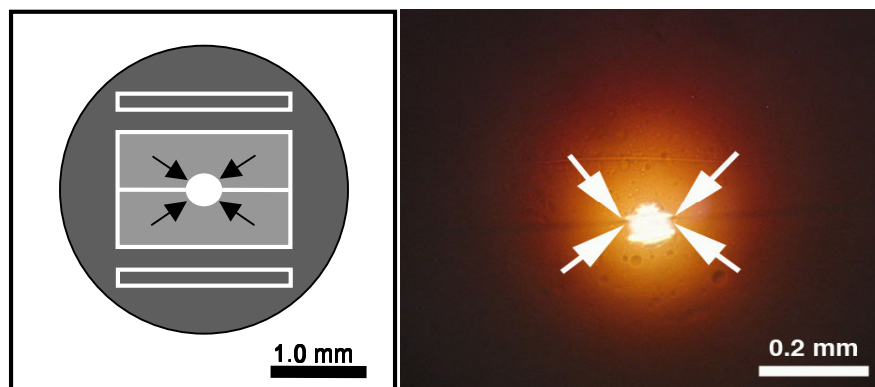


Fig. 2: Diagram and photograph of the MAG*I*CAL® reference standard. The arrows on the drawing and photograph indicate the four regions on the standard where the calibration marks may be found.

DESCRIPTION

The MAG*I*CAL calibration reference standard is an ion milled cross-sectional TEM sample of silicon-based semiconductor multilayer. It consists of four sets of five ~10nm thick SiGe alloy layers, alternating with ~13nm thick pure silicon layers. The device quality epitaxial layers were grown by Molecular Beam Epitaxy (MBE) as strained layers on a single crystal silicon <001> substrate. The four sets of alternating layers (superlattices) provide dark and light contrast in the TEM and were directly calibrated by high resolution transmission electron microscopy (HREM) in reference to the {111} lattice spacing of silicon, as measured on the single crystal silicon substrate. The calibration marking on the standard are directly referenced to a natural constant, namely to the lattice constant of silicon, this way MAG*I*CAL provides unbroken traceability to a fundamental constant of nature.