

Elastic strain measurement from analysis of EBSD patterns

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It has been shown that by comparing an EBSD pattern from a strained crystal with one from an unstrained crystal it is possible to measure the differential shifts of each zone in the pattern from the strained crystal with a precision of ± 1 part in 10000. This is of sufficient precision to make meaningful measurement of residual elastic strain in the sample. By measuring the displacements of four or more zone axes then the displacement tensor can be extracted and subsequently the strain tensor and rigid body rotation matrix.

Examination of the strain distribution around a crack in Ge has confirmed both the precision and accuracy of the method. The technique has been used in the investigation of strain about cracks in fatigued Ni based alloys and in thin films of SiGe on Si.