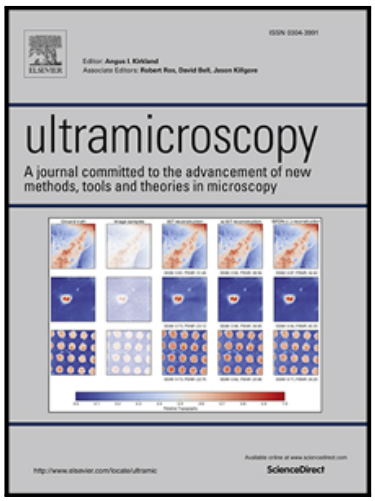

Strain Measurement of 3D Structured Nanodevices by EBSD

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Strain Measurement of 3D Structured Nanodevices by EBSD

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Highlights

- Accurate strain tensors are measured from 3D patterned features as small as 33 nm
- Performing strain analysis on EBSPs from mixed sources causes magnitude errors
- EBSD detector illumination is simulated by electron trajectory simulations
- EBSPs from mixed sources are separated using simulated detector illumination

Abstract

We present a new methodology to accurately measure strain magnitudes from 3D nanodevices using Electron Backscatter Diffraction (EBSD). Because the dimensions of features on these devices are smaller than the interaction volume for backscattered electrons, EBSD patterns from 3D nanodevices will frequently be the superposition of patterns from multiple material regions simultaneously. The effect of this superposition on EBSD strain measurement is demonstrated, along with an approach to separate EBSD patterns from these devices via subtraction. The subtraction procedure is applied to 33 nm wide SiGe lines, and it provides accurate strain magnitudes where the traditional EBSD strain analysis method undervalues the strain magnitude by an order of magnitude. The approach provides a strain measurement technique for nanoscale 3D structures that is high spatial resolution, nondestructive, and accurate.