

Analysis on Determination of Correct Solutions in Orientation Imaging Microscopy

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EBSD is a widely used technique that allows to determine the crystallographic orientation in each point of a scanned surface [1] by measuring and indexing Kikuchi patterns. A triplet voting method can be defined [2], in which a particular orientation can be determined using a triplet of Kikuchi bands and associating to it a *Confidence Index* (CI). In previous work, it has been observed that the use of six Kikuchi bands lead to obtain the correct solution about 95% of the times with a CI of 0.1 in single crystal Si [3]. The present study extends the analysis to explore the influence of other factors on the correctness of the determined orientation such as crystallographic structure and orientation. With this goal, EBSD patterns of single crystal Si and polycrystalline Zn were collected and re-processed using different number of bands, and the relationship between the correctness of solutions and CI was inspected.

The Inverse Pole Figure maps and fraction of correct solutions obtained Si are presented in Fig. 1. It can be observed that the fraction of correct solutions increases with the number of Hough bands used for indexing for each CI, and that for a CI value of 0.1 about 90% of solutions correspond to the correct orientation when at least 8 Hough bands are used. The results shown in Fig. 2 for Zn are quite similar to those obtained for Si, where higher number of bands resulted in a larger fraction of correct solutions for lower CI values, and in this case a 90% of correct results at a CI of 0.1 was reached for 6 bands, while over 95% of correct solutions were obtained with 8 bands. [4]

References:

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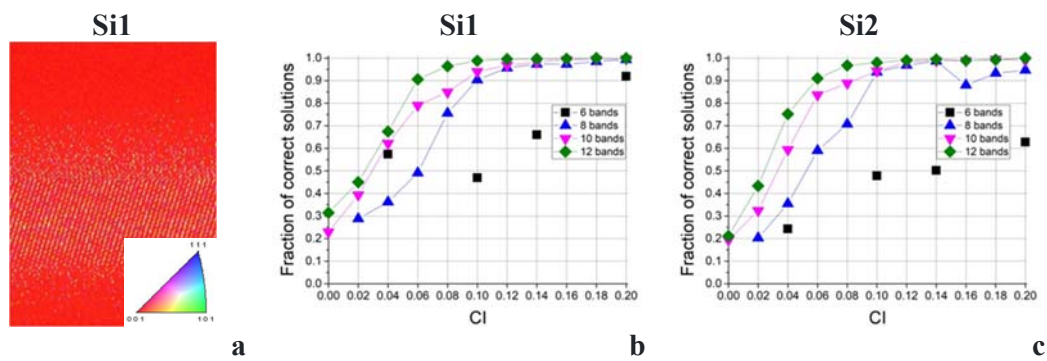


Figure 1: Inverse Pole Figure map (a) and fraction of correct solutions obtained for two different orientations in single crystal Si (b and c).

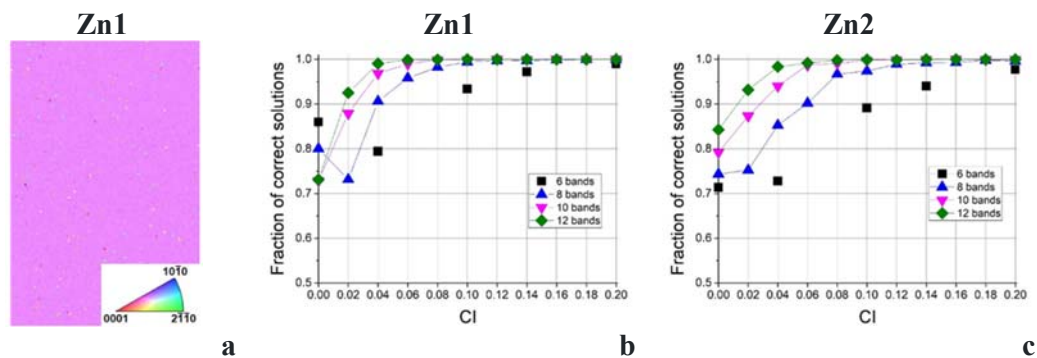


Figure 2: Inverse Pole Figure maps (a) and fraction of correct solutions obtained for two different orientations in polycrystalline Zn (b and c).