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**IT-9-P-2120 Statistical evaluation of 3D planes in polycrystalline materials from 2D Electron Backscatter Diffraction (EBSD) maps**

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Scanning electron microscope (SEM) fitted with electron backscatter diffraction (EBSD) detector reached widespread popularity for gaining crystallographic information from a surface of crystalline materials. The main limitation of EBSD technique during two-dimensional mapping is missing depth information. However, in comparison with time-consuming 3D EBSD that require focused ion beam (FIB), 2D EBSD technique needs simpler equipment and easier post-processing.

In this work, uncomplicated statistical approach is presented to find dominant planes such as grain boundaries and fracture planes in bulk polycrystalline materials. The model is based on analysis of intersections of demanded planes with plane of EBSD mapping. Intersection of the two planes generates traces which are further evaluated. For experimental verification metals with hexagonal close packed (hcp) structure were selected; namely magnesium and titanium since they are very attractive for many industrial applications. Data were acquired on SEM FEI Quanta 3D FEG fitted with Hikari EBSD camera. It is shown that the approach combining 2D EBSD mapping with calculations in Matlab software can evaluate the results very well even with moderate amount of experimental data. With this technique dominant planes such as abundant {10-12} <11-20> 86° twin boundaries in wrought magnesium alloy AZ31 (nominally Mg-3wt%Al-1wt%Zn) and preferred fracture plane in duplex phase titanium grade 2 (nominally <0.3wt%Fe, <0.25wt%O, <0.015wt%H) submitted to uniaxial tension at room temperature were successfully analyzed. An example of statistical evaluation in wrought magnesium alloy AZ31 with a number of {10-12} <11-20> 86° twin boundaries is shown in Fig. 1.

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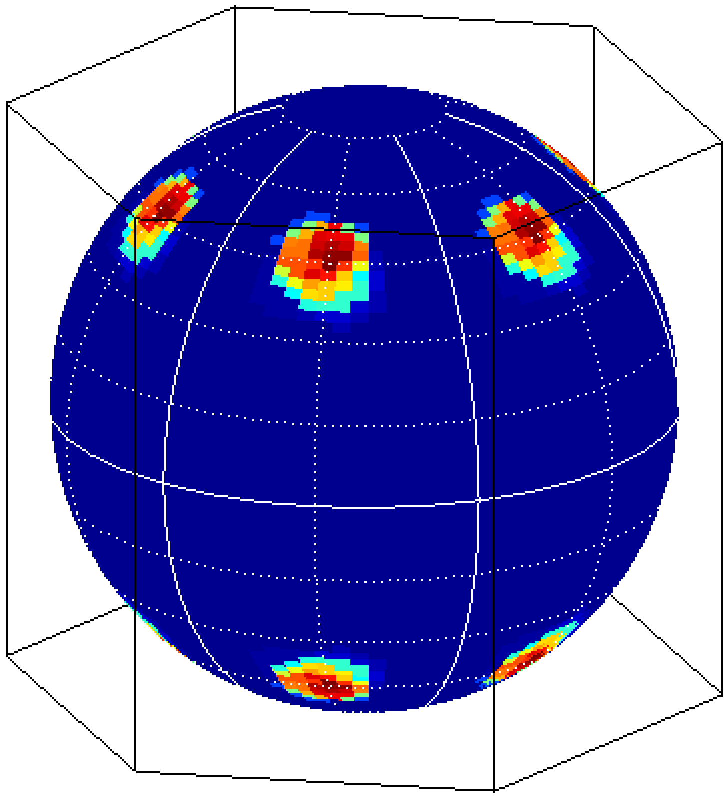

Fig. 1: Fig. 1: Normals to boundary planes found with the help of the approach. The results correctly show abundant {10-12} <11-20> 86° twin boundaries in wrought magnesium alloy AZ31.