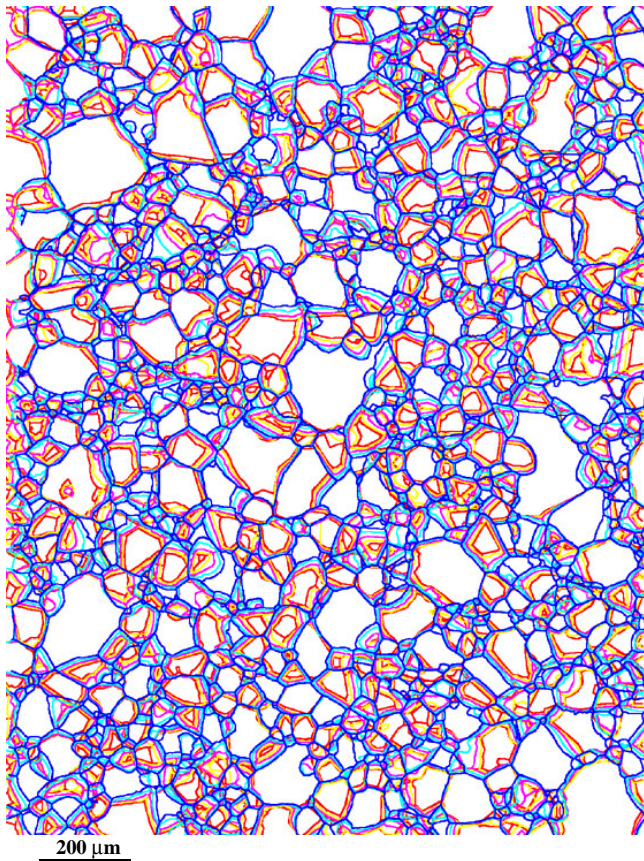


Distribution of Grain Boundary Planes at Fixed Misorientations in Polycrystalline MgO

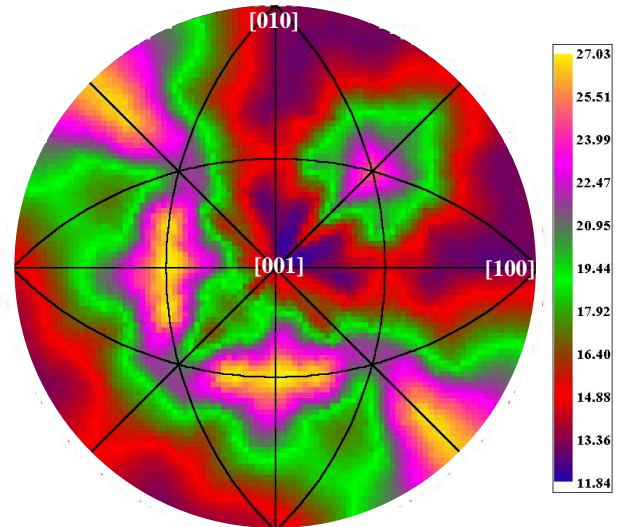


Skeletonized montage of grain boundaries created from 980 individual SEM images on five section planes: dark blue ($z = 0$), light blue ($z = -6.6 \mu\text{m}$), pink ($z = -13.4 \mu\text{m}$), yellow ($z = -22.4 \mu\text{m}$), red ($z = -27.8 \mu\text{m}$).

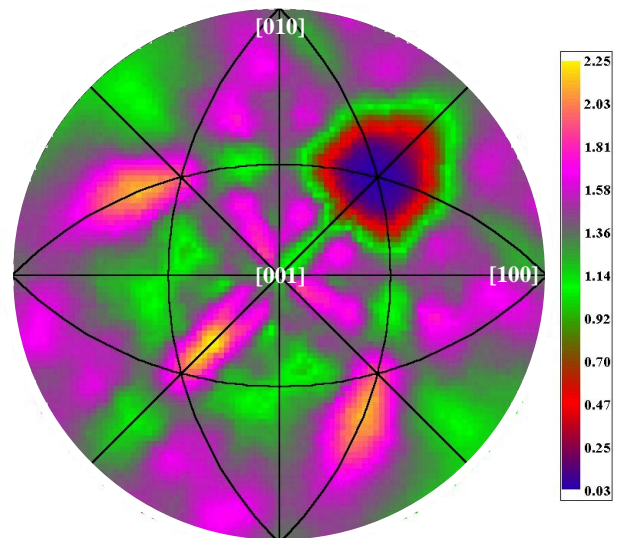
What is the crystallographic distribution of grain boundary planes for interfaces with the same lattice misorientation? To answer this question, it is necessary to microscopically characterize a large number of grain boundaries. High resolution SEM images and crystal orientation data derived from EBSPs were recorded on five parallel section planes of a polycrystalline MgO specimen. By combining these data, $2.5 \times 10^6 \mu\text{m}^2$ of boundary plane area, surrounding 2400 grains, was characterized. The results demonstrate that in this sample, the boundary plane space is not uniformly occupied. Here, we use inverse pole figures to show the distribution of boundary planes at two selected points in the three dimensional misorientation space. For low angle boundaries about the $[111]$ misorientation axis, boundary normals perpendicular (tilt) and parallel (twist) to the misorientation axis are favored. For boundaries with a 60° misorientation about $[111]$ ($\Sigma 3$), specific tilt planes are strongly favored and twist boundaries are avoided.

Third Place, Ceramographic Competition, 2001

Classification: Problem Solving



Inverse pole figures in the standard projection on (001) showing the distribution of grain boundary planes for boundaries misoriented by 5° about $[111]$ (above) and 60° about $[111]$ (below). The contours are in multiples of a random distribution.



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