TIPS AND TRICKS

Reduced Sampling for Texture Calculations

In our recent webinar, *Texture Analysis via EBSD*, Dr. Stuart Wright emphasized the need for sampling enough orientations for statistical reliability in characterizing a texture. What may not be clear is that the key is the number of grain orientations, as opposed to the number of orientations measured. Often, scientists will want to characterize not only the texture of the material but also the grain size or other microstructural characteristics. To capture the texture accurately, scientists will want to measure approximately 10,000 grains [1] and about 500 pixels per average grain in order to capture the grain size well [2]. This results in a scan with approximately five million datapoints. This is actually a pretty reasonable scan on modern systems but it can be a bit cumbersome to deal with in terms of calculating the texture. OIM Analysis™ has some tools to make the texture calculations more efficient on large datasets.

There are several options for reducing the number of orientations considered in calculating the texture. In an example like that cited above, it is very likely that users will want to calculate the grain size. Thus, the option to use the area weighted average grain orientations is useful (Figure 1). With this option, the average orientation for each grain is determined and then the texture calculation is performed using these average orientations instead of each orientation measurement in the dataset. Thus, instead of calculating the texture using all five million points, only the average orientations for the 10,000 grains are needed. On most desktop PCs, 10,000 points require about five seconds, whereas 2.2 million points take two minutes and that is with the multithreading for texture calculations implemented in OIM Analysis™ v8.

How good is this approximation? Figure 2 shows the results for a small study on a sample with a moderate (110) fiber texture. Clearly the match between the textures calculated using all of the points as opposed to those based on the average grain orientations is excellent.

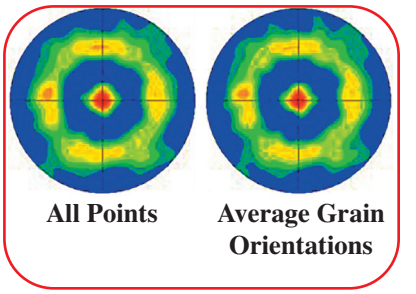

Figure 2. The results for a small study on a sample with moderate (110) fiber texture.

References

[1] SI Wright, MM Nowell & JF Bingert (2007) "A comparison of textures measured using X-ray and electron backscatter diffraction". *Metallurgical and Materials Transactions* A, **38**, 1845-1855

[2] SI Wright (2010) "A Parametric Study of Electron Backscatter Diffraction based Grain Size Measurements". *Practical Metallography*, **47**, 16-33.

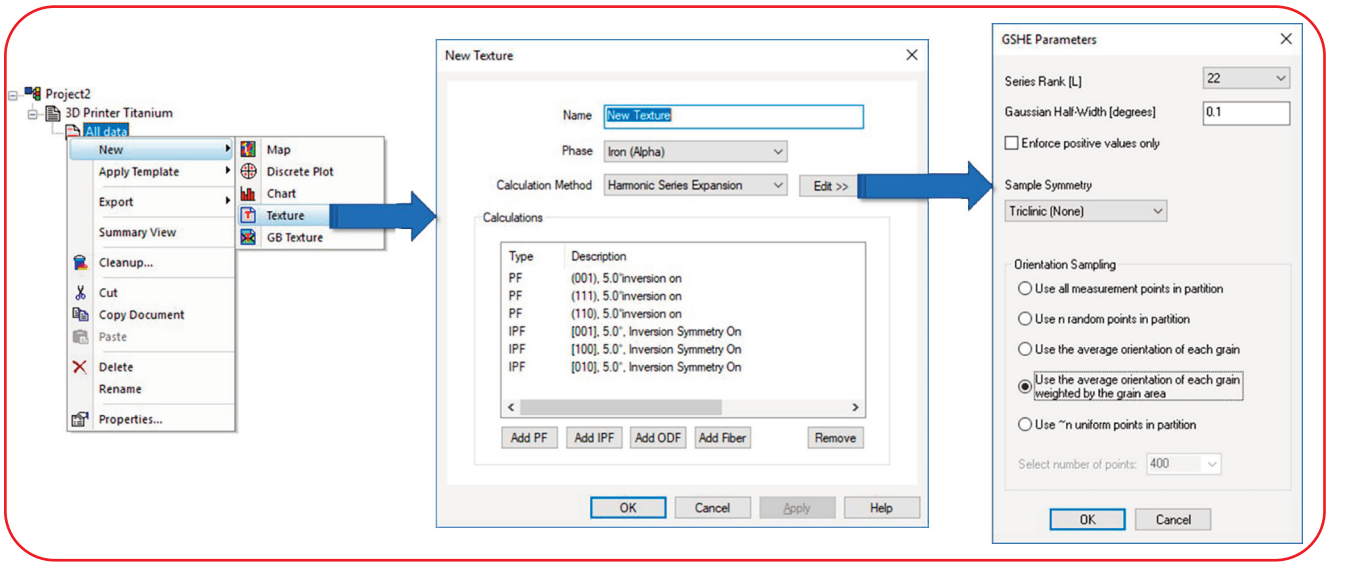

Figure 1. The Texture option in OIM Analysis™ where you can set GSHE parameters.

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