

Featured Article

Texture plugin of SmartLab Studio II

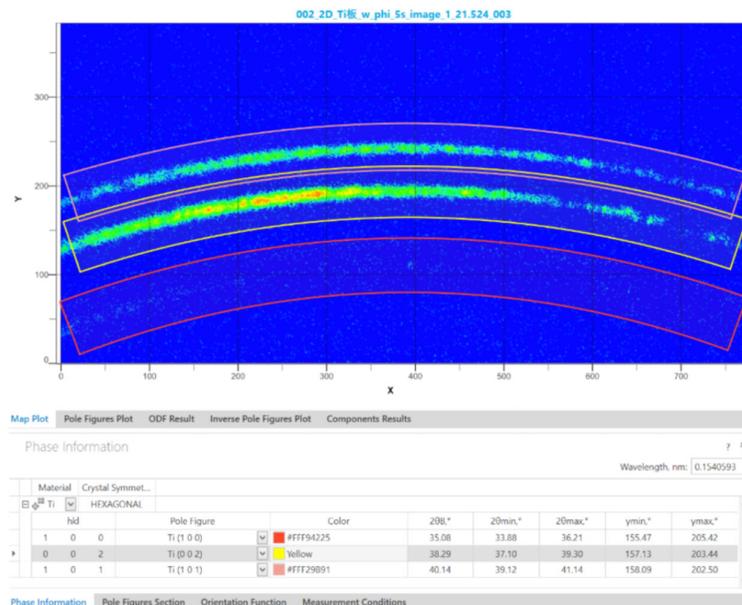
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The presence of crystallographic texture (preferred orientations) in polycrystalline materials has a significant effect on the anisotropy of the properties of such materials. That means that the quantitative description of the orientation distribution of crystallites, known as the orientation distribution function (ODF), is an important task for material characterization and prediction of their properties. Since direct measurement of the ODF is not possible, pole figures (PF) can be used to determine the ODF. Reconstruction of the ODF from measured PFs is a main goal of quantitative texture analysis.

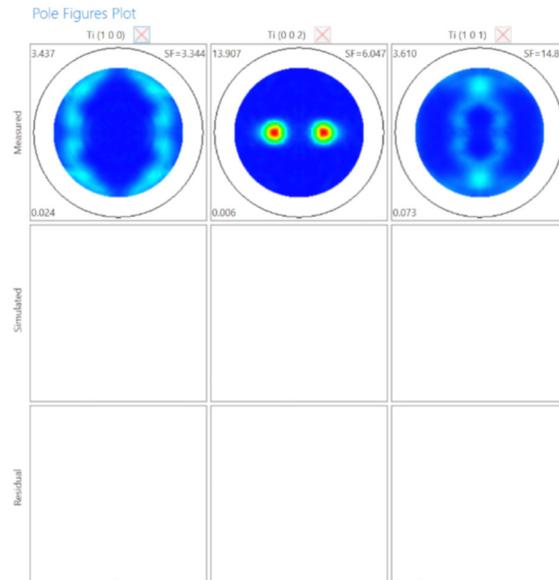
Currently, three methods are used for ODF reconstruction: the series expansion method, the component method, and direct methods like WIMV or ADC. Each method has advantages and disadvantages. Although the series expansion method is popular, it requires a large number of measured PFs for the calculation and has some problems with numerical calculations. The component method represents the ODF as a set of model functions (components) that have a clear physical meaning. This method is the most convenient for interpretation and representation of the results, but it could require effort to select the appropriate components and fitting parameters. Direct methods use a numerical calculation of the ODF on a discrete grid in rotation space. They are the simplest and the most convenient to use, but do not give a good interpretation of the ODF.

Now the **SmartLab Studio II** program suite offers a new plugin called **Texture**, which is intended for quantitative texture analysis. The **Texture** plugin implements WIMV and component methods for ODF reconstruction and can use pole figures measured with a 0D detector or process 2D images to create pole figures. For the ODF calculation, all crystal symmetries are supported. Basic steps are demonstrated below:

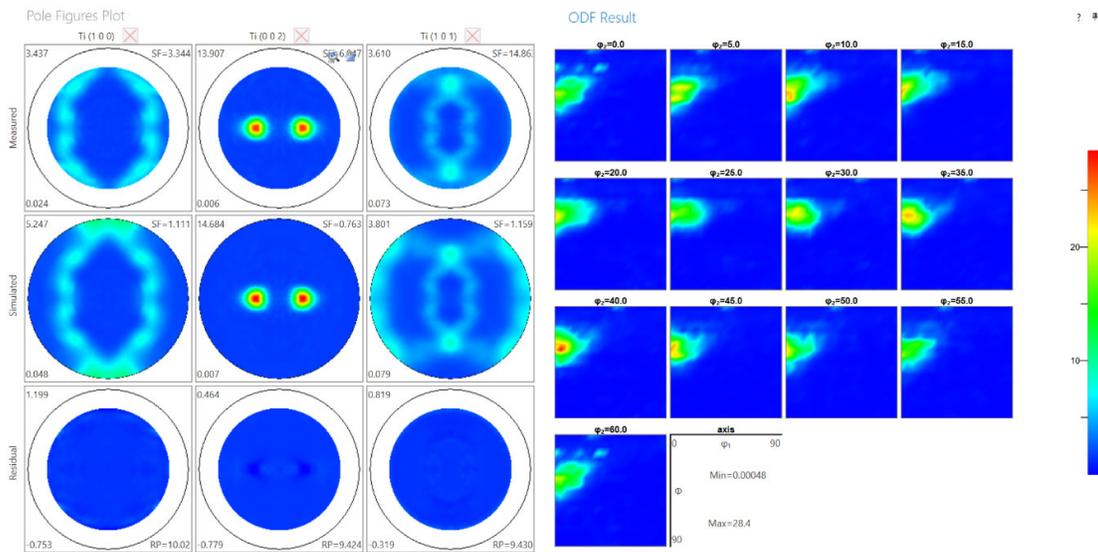
- (1) Load 2D data and define phases and reflections. Several phases and reflections can be processed simultaneously. Parameters of reflections for processing can easily be estimated by one click.



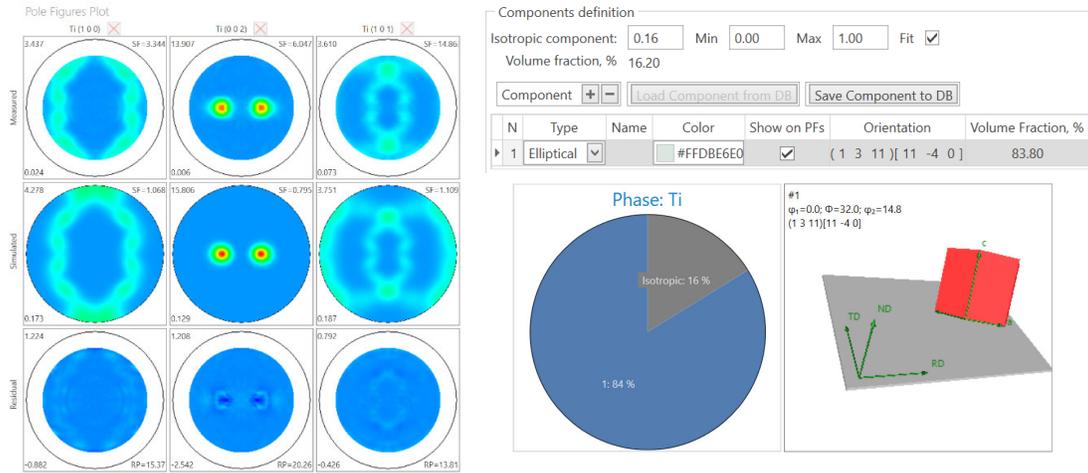
- (2) Create pole figures and apply the required corrections. A series of corrections can be applied to pole figures. If pole figures are measured in both reflection and transmission modes, they can be combined.



- (3) Calculating the ODF and simulated (recalculated) pole figures using WIMV method. This model gives the fastest result.



- (4) Calculate the ODF and simulated (recalculated) pole figures using the component method. The component method calculates the volume fraction of each crystal orientation and gives a visual representation of the orientations.



For both models, pole figures and inverse pole figures can be calculated for measured reflections and also for other reflections that are not measured. The **Texture** plugin has a wide variety of graphical ability for pole figures and ODF representation and reporting.