

Supplementary Information

Intensity of inhomogeneity determination using ImageJ and OriginPro

In the following, the method for the determination of the intensity of inhomogeneity of a test line is described in detail. Here, ImageJ and OriginPro are used for the analysis. The test lines were scanned at 1200 dpi for the digital image analysis.

Image analysis: Determination of gray values

The image analysis is done using ImageJ. First, the scanned picture of the test line is imported. A rectangle of the size 139x19 pixel is drawn over the test line as shown in Figure 1. The data is saved as csv-file.

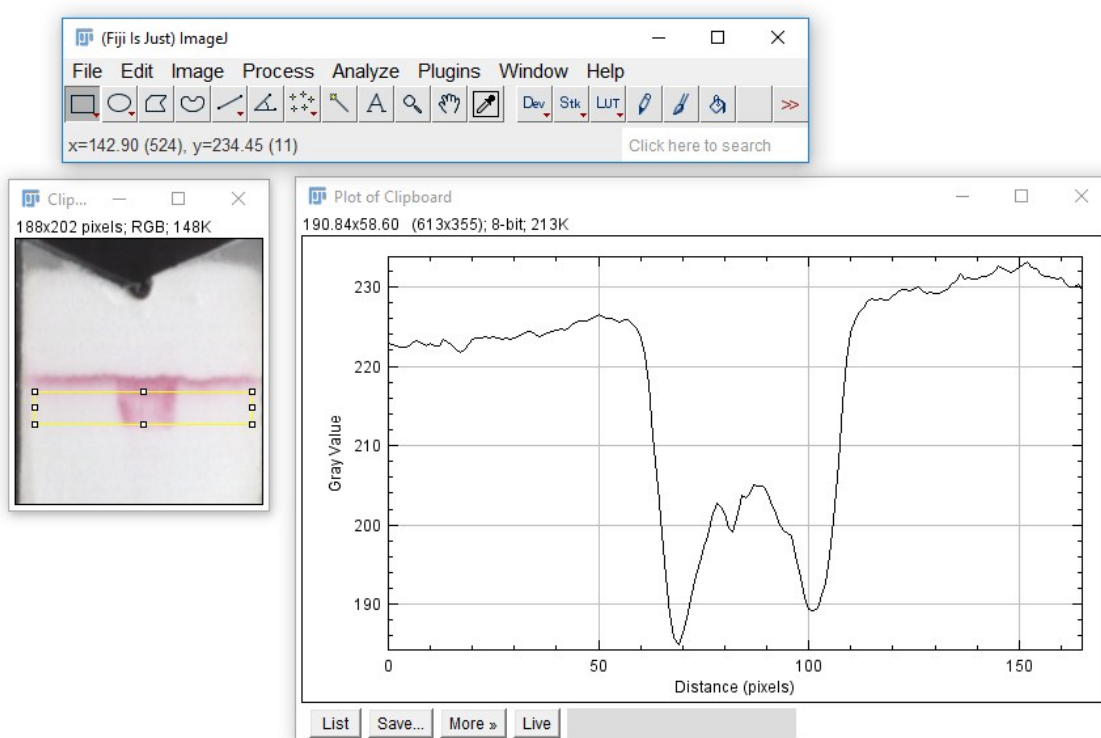


Figure 1: The first step in the determination of the intensity of inhomogeneities is the creation of a profile plot to get the mean gray values over the distance in pixels over the length of the test line as shown in the figure.

Gray value analysis: Determination of the peak area

The analysis of the gray values of the profile plots is done in OriginPro using the integrated *Peak Analyzer*. Thereto, the csv-file is imported in OriginPro and the Peak Analyzer is started. *Integrate Peaks* is selected as goal. The method bases on three steps: baseline definition, find and integrate peaks.

The anchor points for the spline baseline are user defined for better handling of the outer edges. Four points are chosen as shown in Figure 2. No baseline treatment is chosen. In the end, the peak position is found as shown in Figure 3 and the peak analysis is started to calculate the peak area. Here, the peak area is defined as intensity of inhomogeneity and is an indicator for the appearance of bypass.

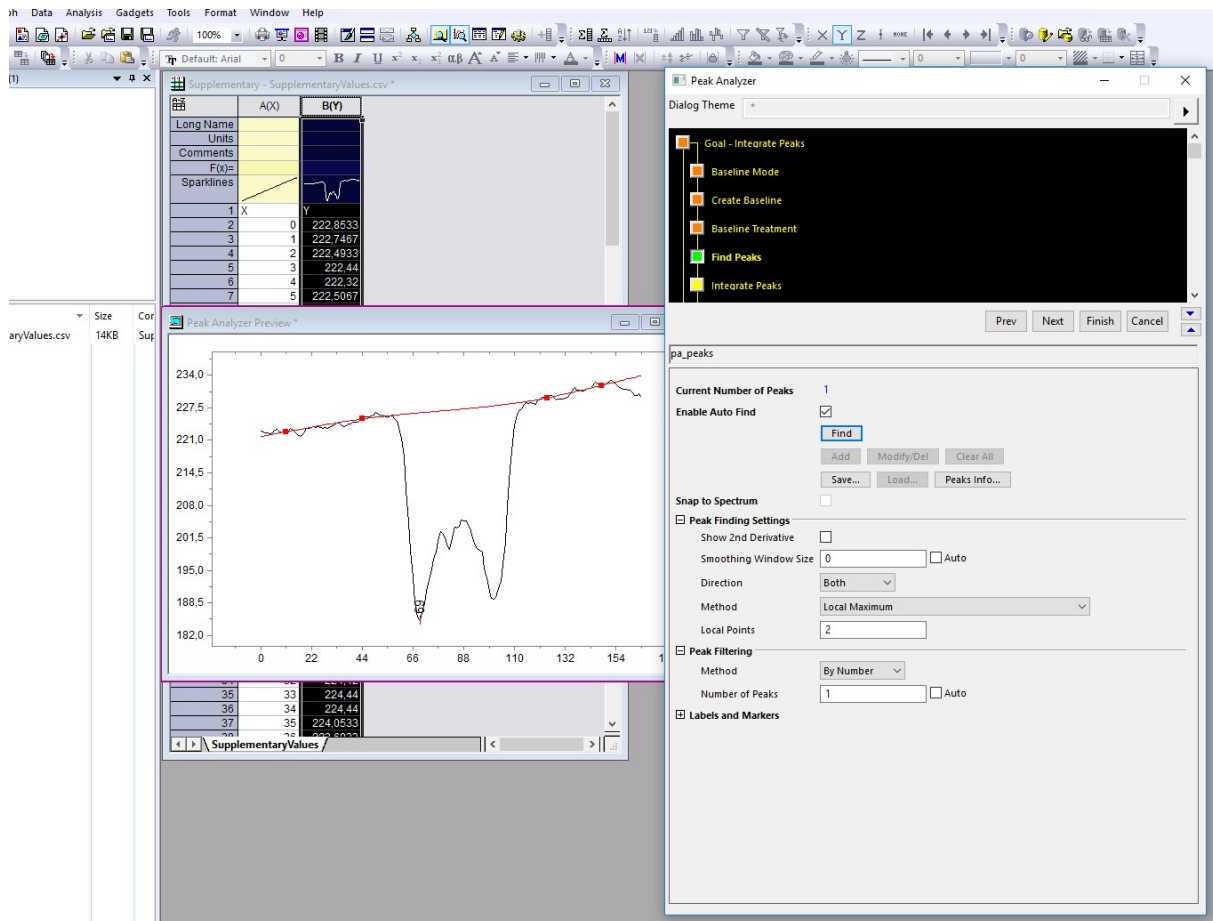


Figure 2: A baseline is created to perform subsequently an automated peak analysis in Origin. Four anchor points are chosen on the baseline of the strip to fit a spline baseline.

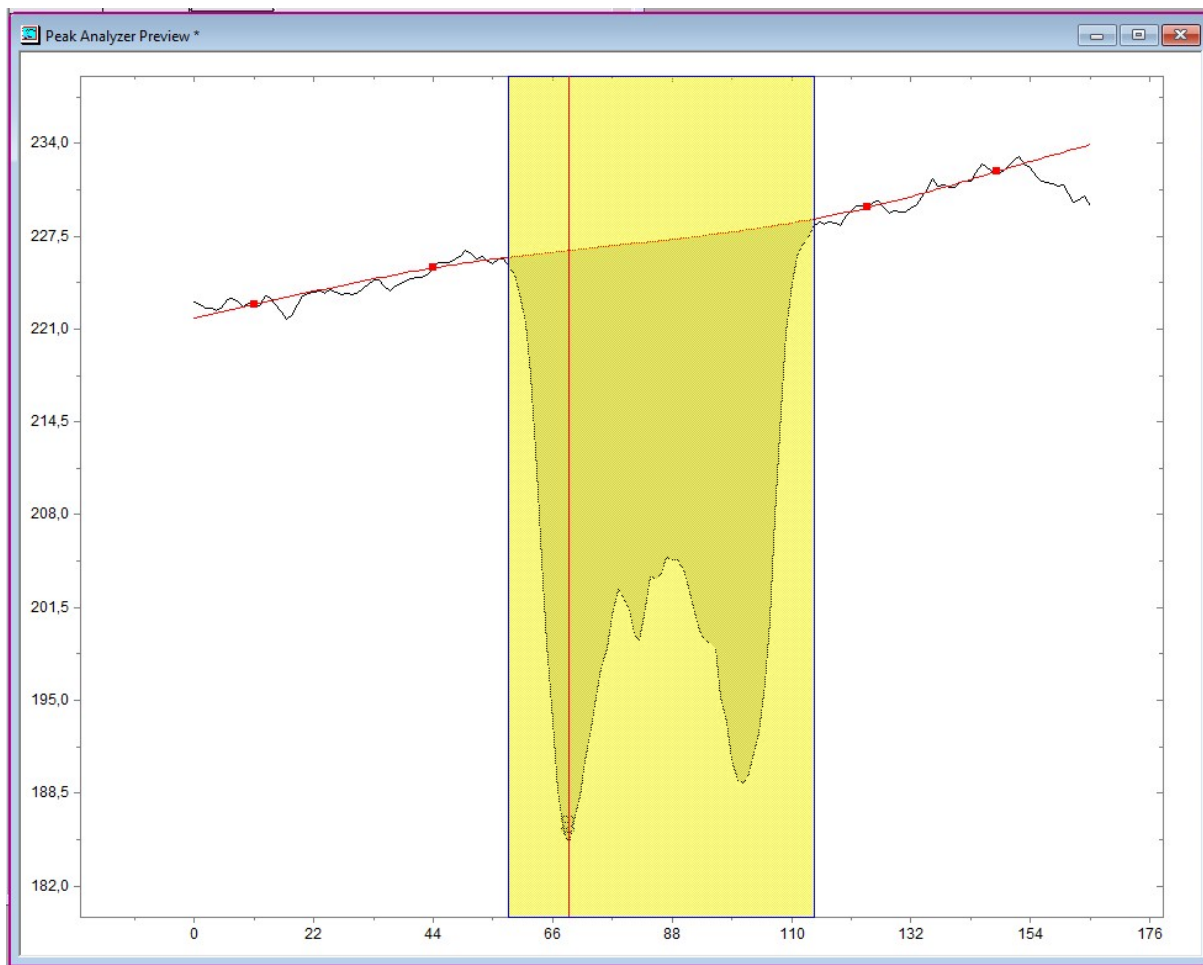


Figure 3: In the last step the automated peak analysis of origin is started to get the peak area which is defined in this paper intensity of inhomogeneity.