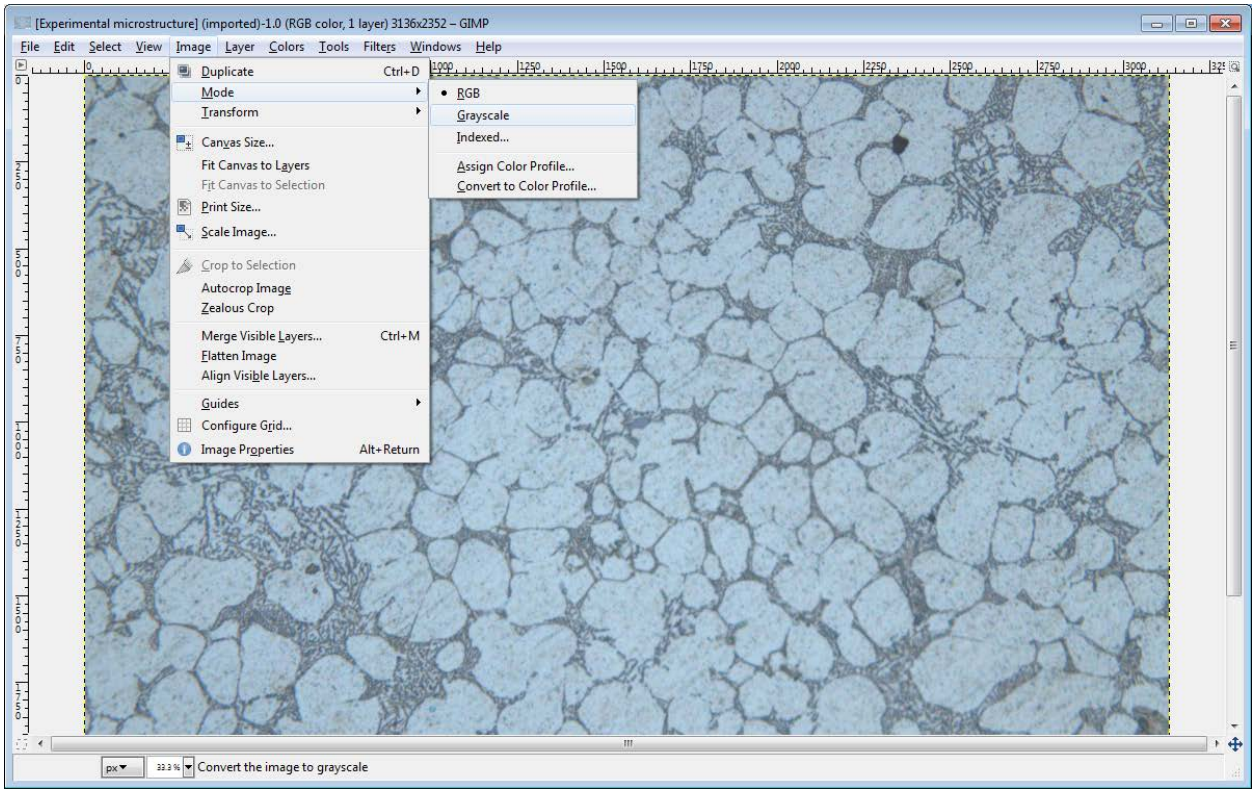
Preparing Experimental Microstructures for MICRESS®

From a coloured picture (JPG) of an experimental microstructure to a MICRESS microstructure input file

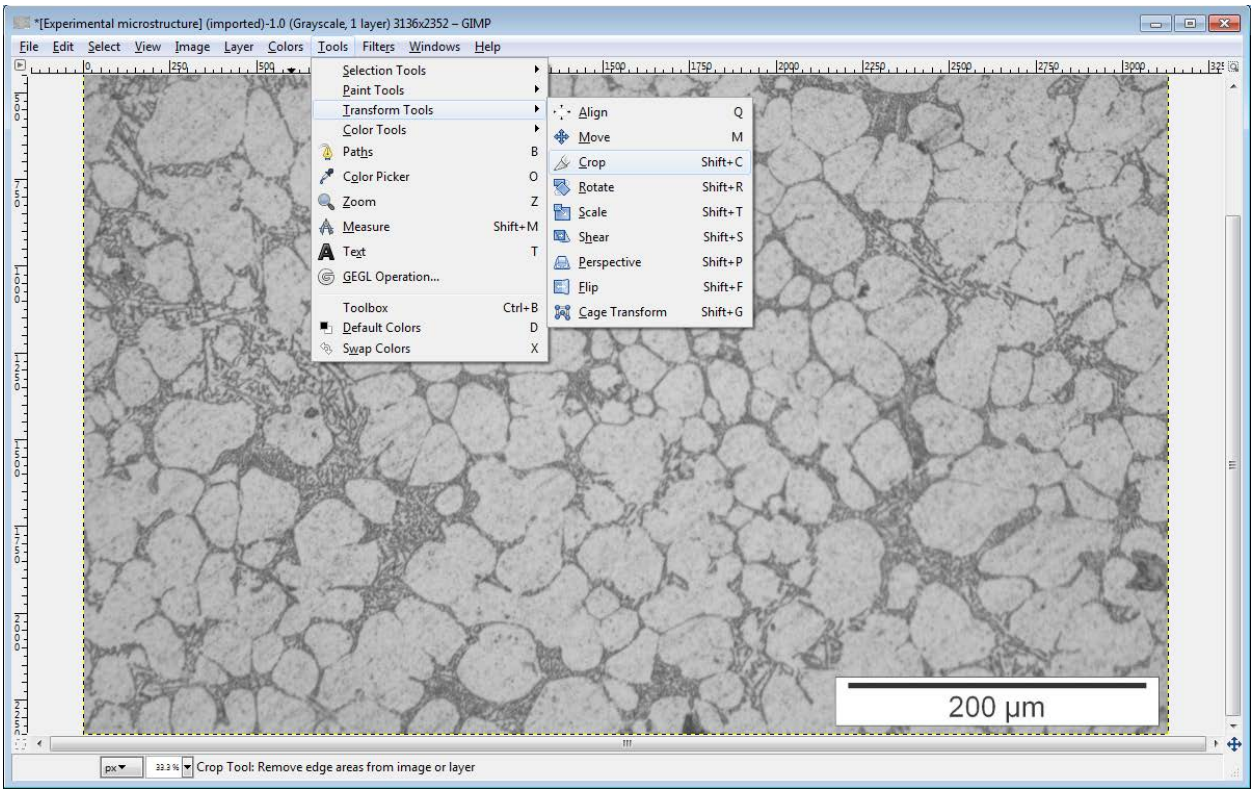
Tools:

- GIMP : GNU image manipulation program (http://www.gimp.org/)
- PGM_to_MICRESS.exe : a perl self-extracting script archive (attached file)

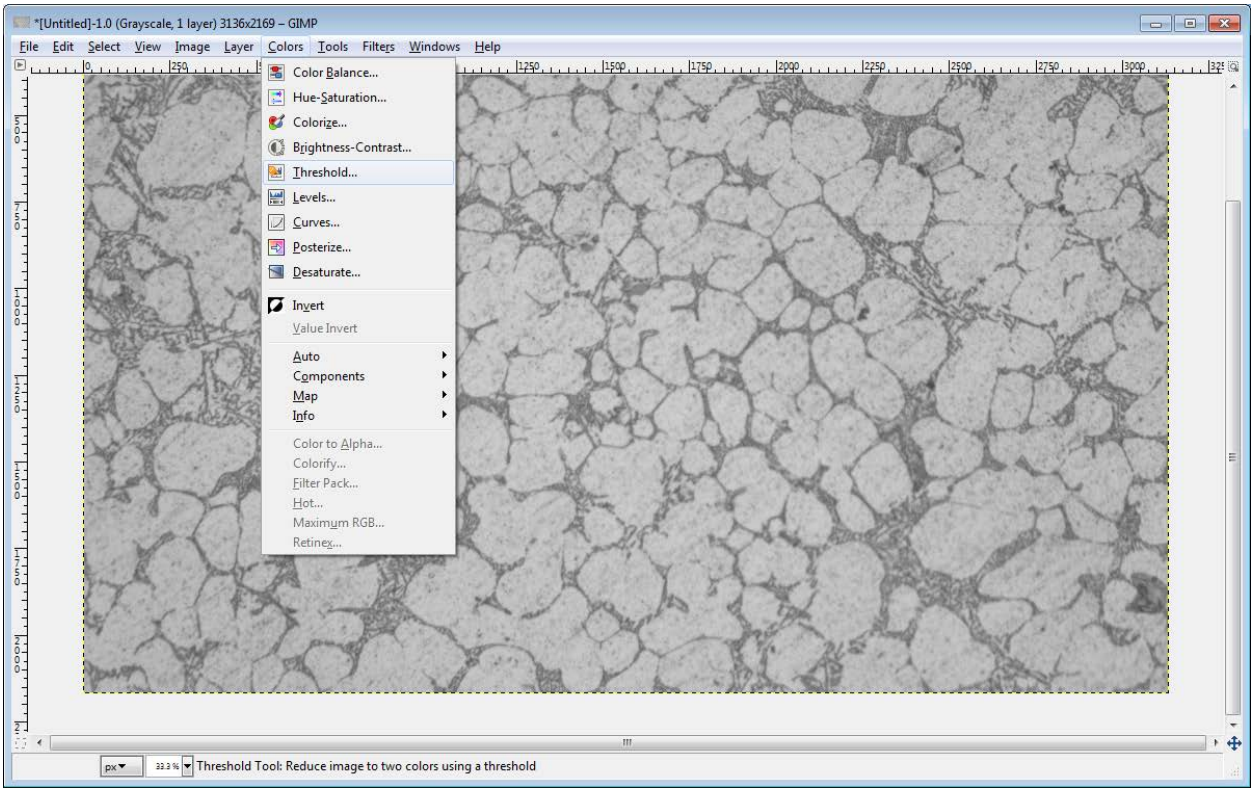
1. Open the picture of the exp. microstructure in GIMP
2. Select greyscale mode

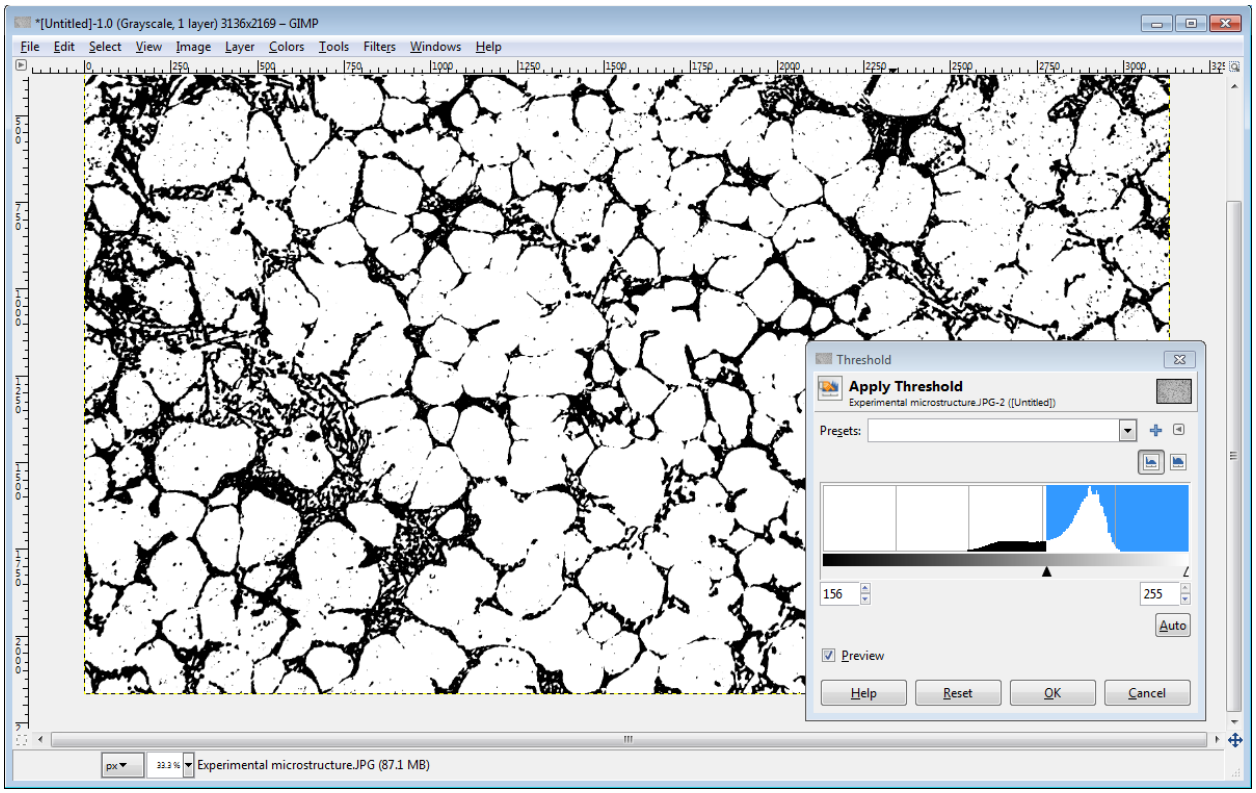


3. Crop everything in the picture that is a microstructure (i.e. not the length scale). Using the ‚Crop' tool, select the part you wish to have in the resulting picture.

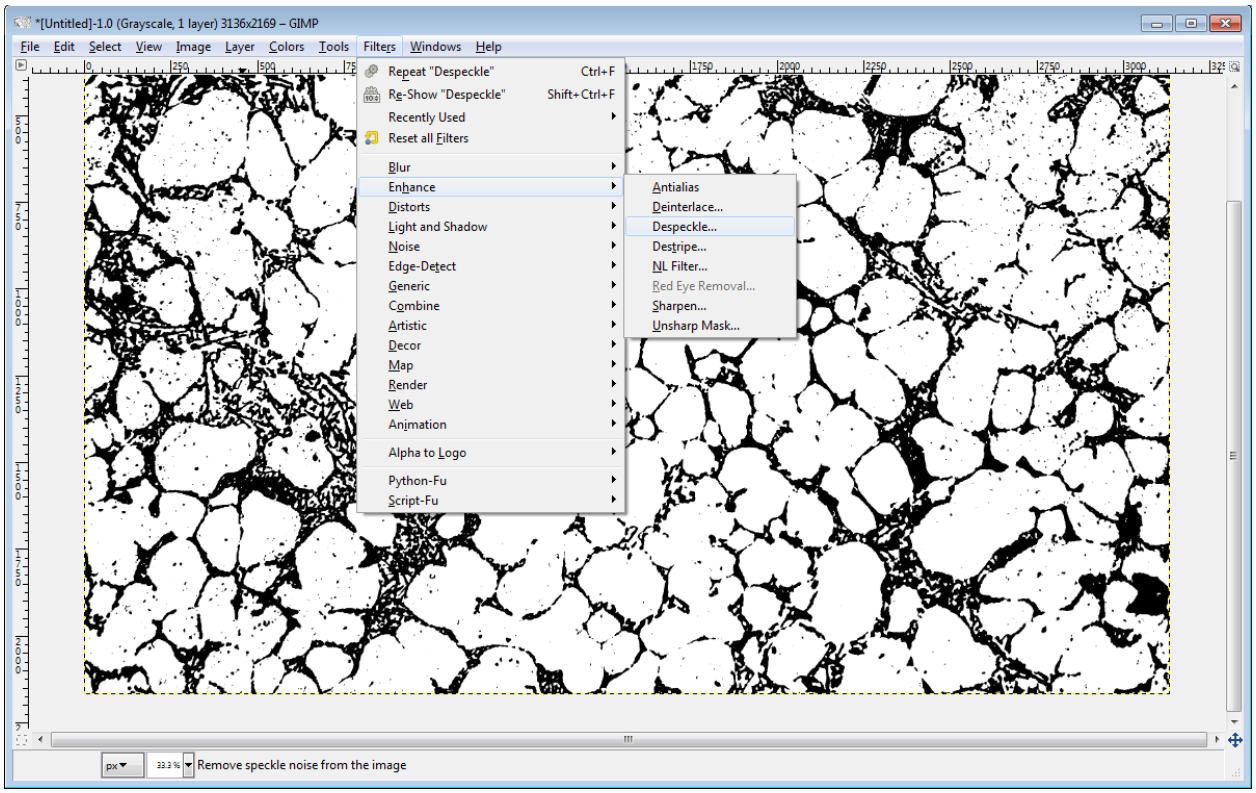


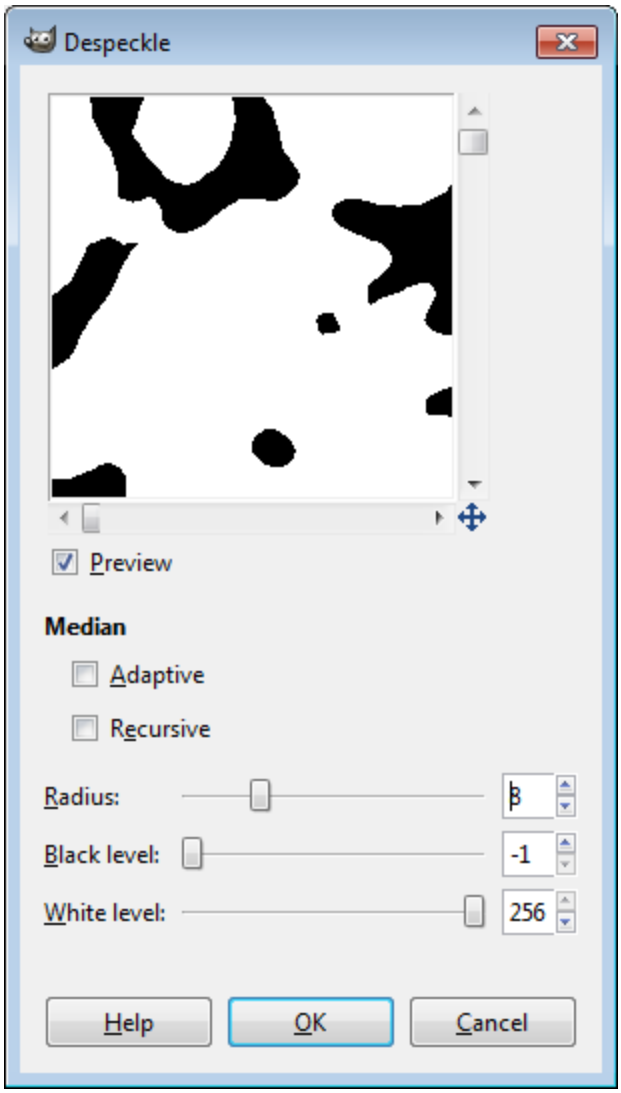
4. Adjust the colours with the threshold tool

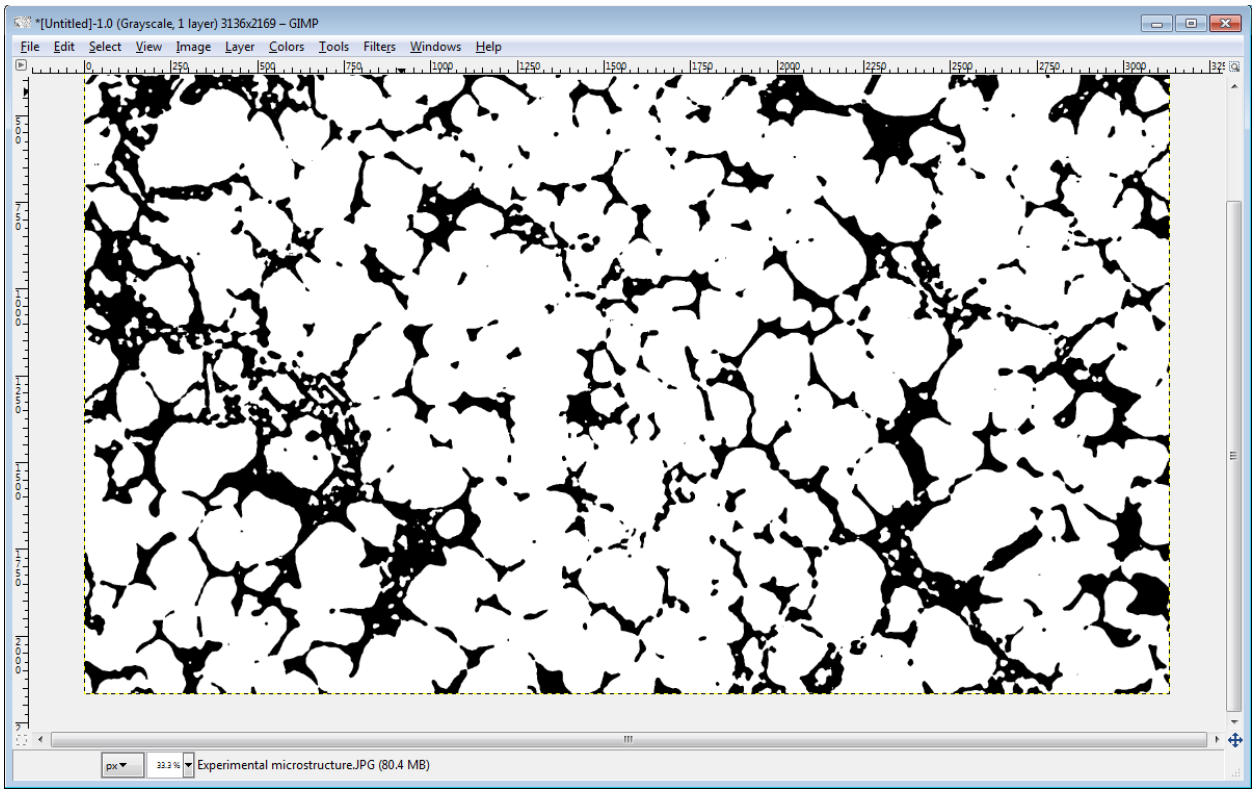




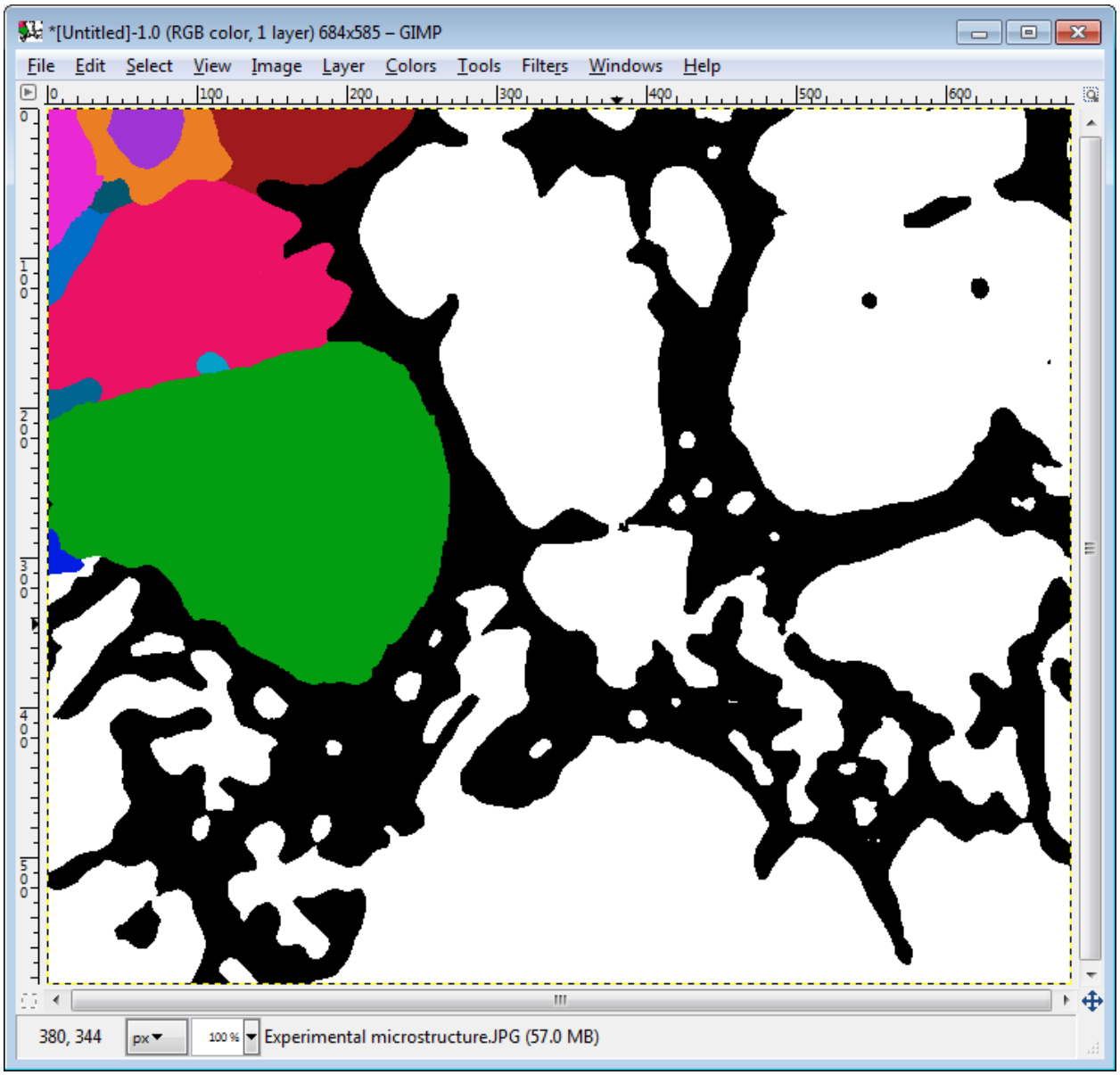
5. Despeckle the bulk regions with a the despeckle filter tool


*[Untitled]-1.0 (Grayscale, 1 layer) 3136x2169 – GIMP
File Edit Select View Image Layer Colors Tools Filters Windows Help
Repeat "Despeckle" Ctrl+F
Re-Show "Despeckle" Shift+Ctrl+F
Recently Used
Reset all Filters
Blur
Enhance
Distorts
Light and Shadow
Noise
Edge-Detect
Generic
Combine
Artistic
Decor
Map
Render
Web
Animation
Alpha to Logo
Python-Fu
Script-Fu
Antialias
Deinterlace...
Despeckle...
Destripe...
NL Filter...
Red Eye Removal...
Sharpen...
Unsharp Mask...
Remove speckle noise from the image

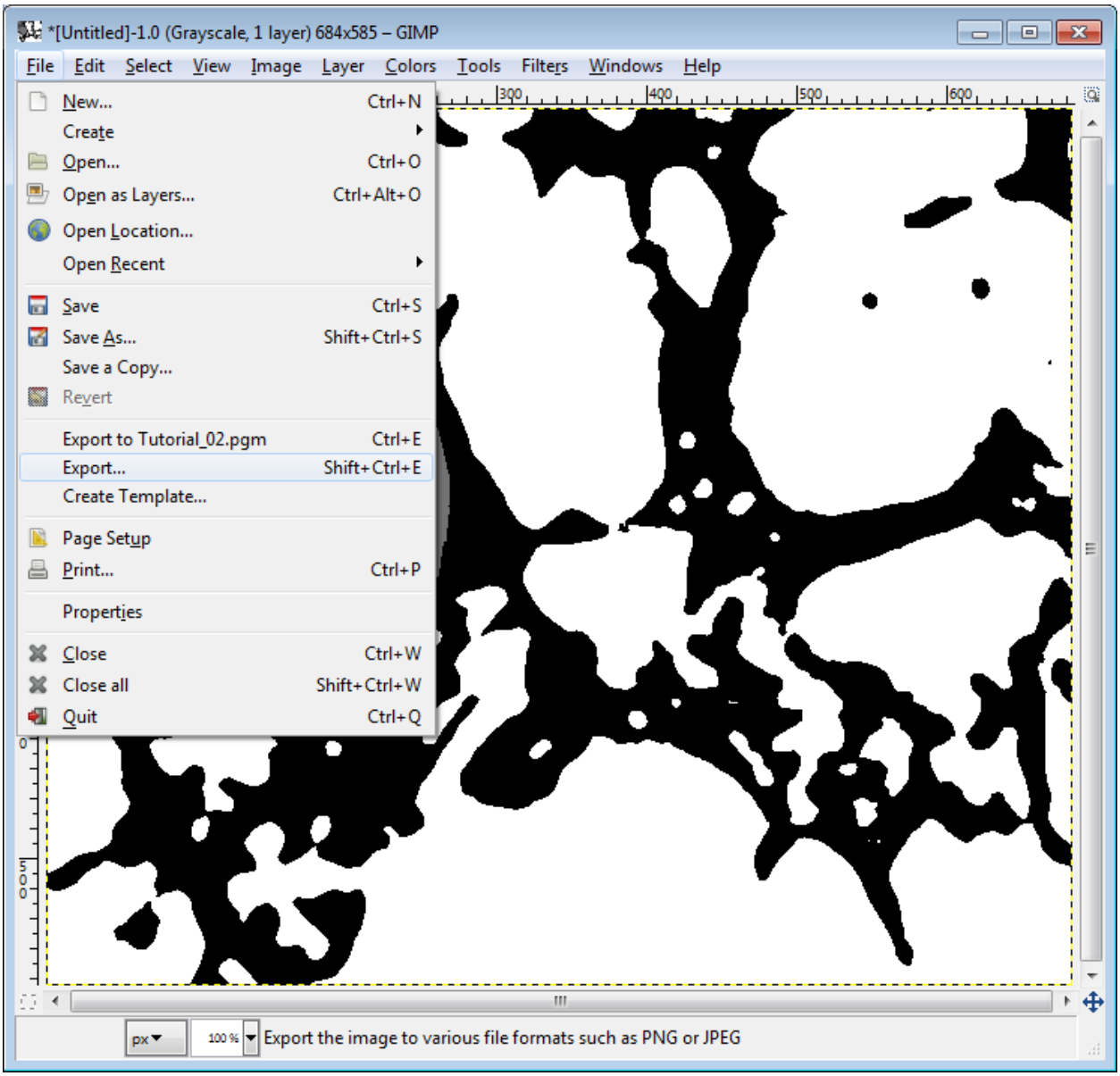

Despeckle
Preview
Median
Adaptive
Recursive
Radius:
8
Black level:
-1
White level:
256
Help
OK
Cancel



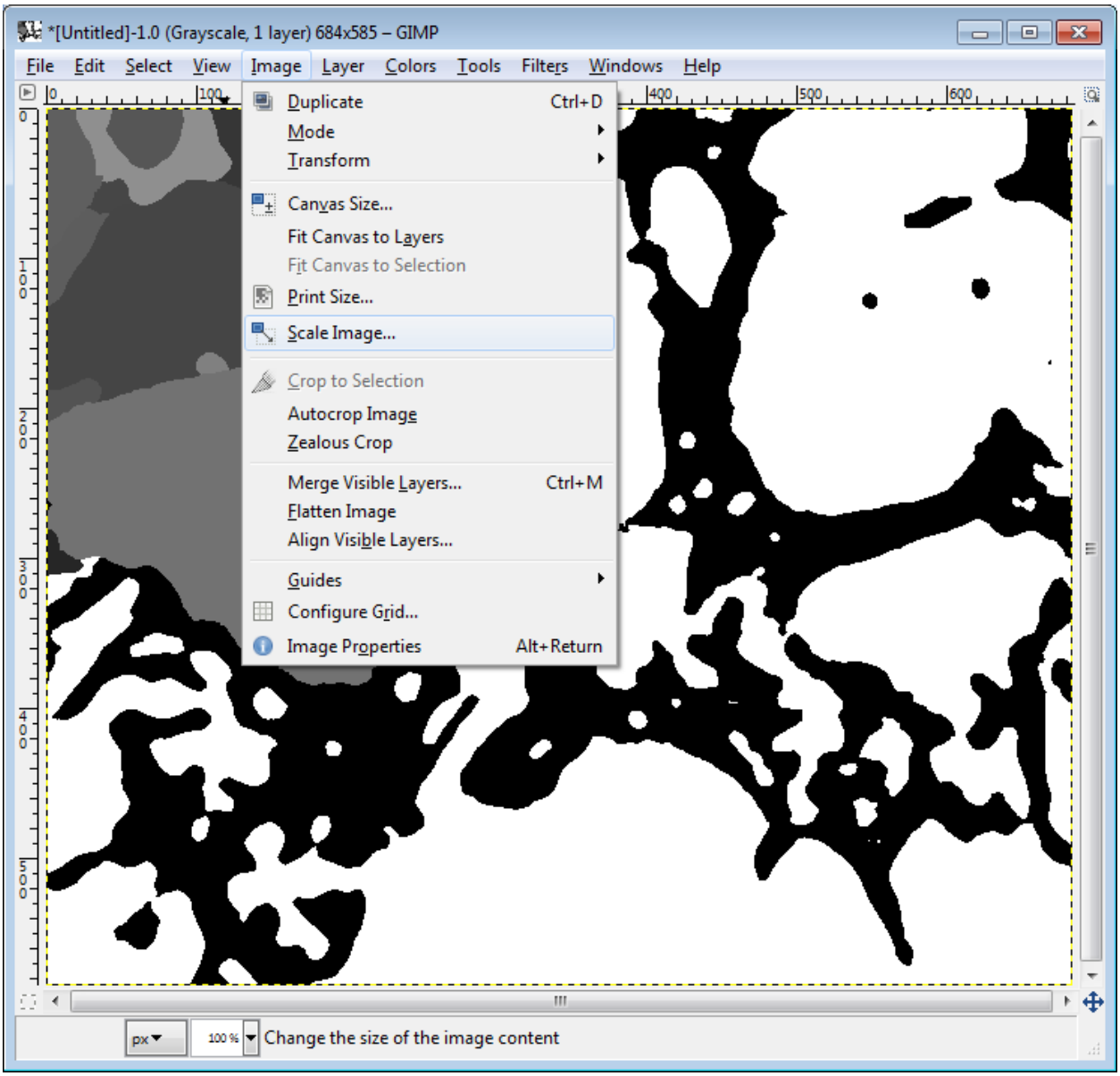
6. Switch to RGB mode again (Image->Mode-RGB)
7. Add the lacking grain interfaces manually to get closed grain regions. This is the most work intensive part because you have to use the drawing tools.
   See here the upper left corner of the picture made by using the pencil, color picker, bucket fill and eraser tool.
   Every color will be interpreted as a grain number by MICRESS later.

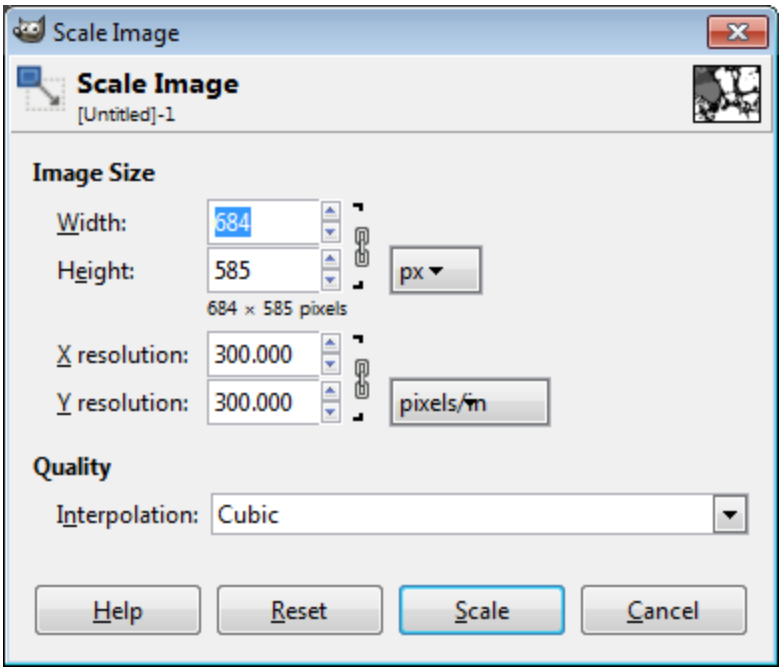


8. Switch to gray scale mode
9. Export the image as a PGM file with ASCII data (!!!)



10. Note the dimensions of the picture for later specification in the MICRESS driving file
    Height -> Z dimension in MICRESS
    Width -> X dimension

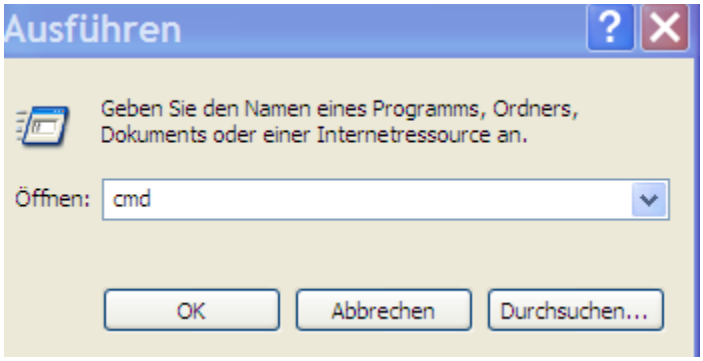

*[Untitled]-1.0 (Grayscale, 1 layer) 684x585 – GIMP
File Edit Select View Image Layer Colors Tools Filters Windows Help
Duplicate Ctrl+D
Mode
Transform
Canvas Size...
Fit Canvas to Layers
Fit Canvas to Selection
Print Size...
Scale Image...
Crop to Selection
Autocrop Image
Zealous Crop
Merge Visible Layers... Ctrl+M
Flatten Image
Align Visible Layers...
Guides
Configure Grid...
Image Properties Alt+Return
px
100 %
Change the size of the image content



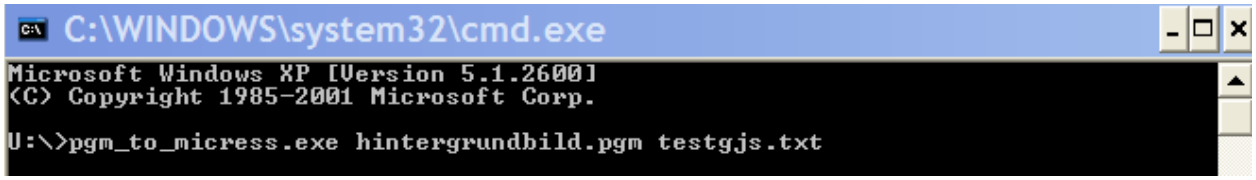
11. Convert this PGM file to a MICRESS conform microstructure text file with the provided script tool PGM_to_MICRESS.exe
    E.g. on the command line: PGM_to_MICRESS.exe <PGM file> <microstructure.txt>

for this purpose:

a) open a DOS Window



b) be sure that the pgm_to_micress .exe is in the directory specified in the command box (here U:\) and type command according to:



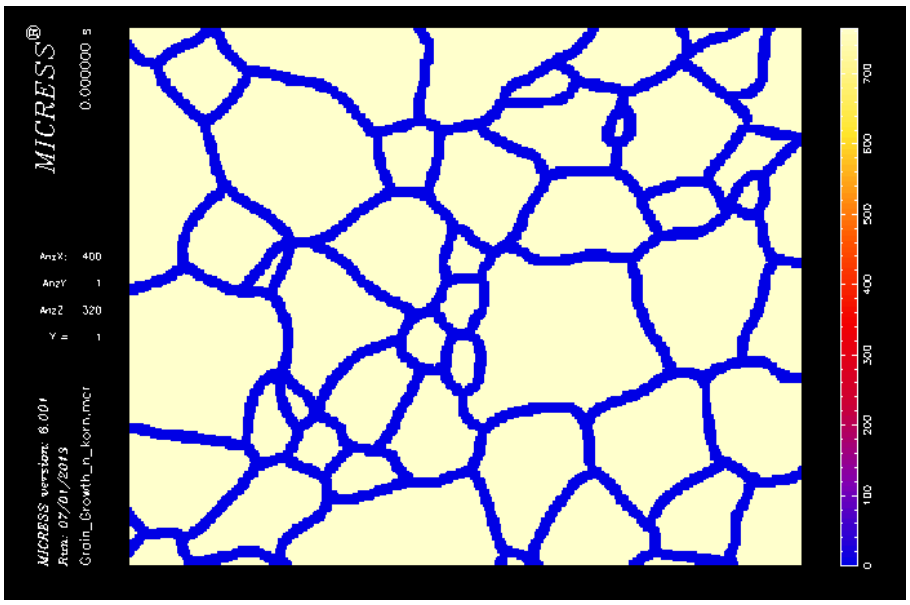
Be sure to include the extension " .txt" for the output file. The output will be generated in the same directory (here U:\)

12. Modify the grain input part in the MICRESS driving file (e.g. Grain_Growth_dri.txt)

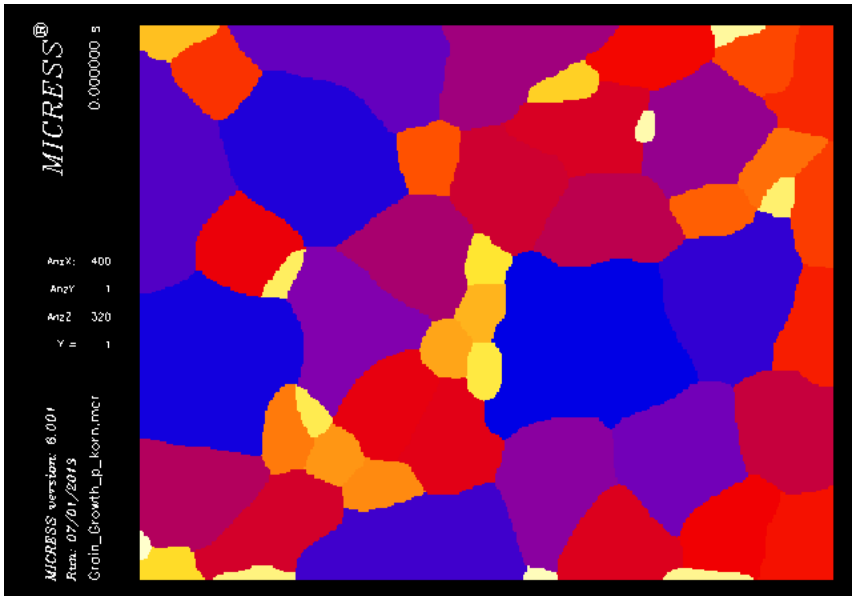
```
# Grain input
# ===========
# Type of grain positioning?
# Options:  deterministic   random   from_file
from_file
# File for initial grain/phase structure
Grain_Growth_Microstructure.txt
# Treatment of data?
# (n: none, 1: 1D, f: flip (bottom<->top), t: transpose,
#  or p: 'phase to grains transformation')
f
# AnzX for initial microstructure?
684
# AnzZ for initial microstructure?
585
# Number of grains at the beginning?
# (Set to less than 1 to read from input data,
#  with optionally a minimal size, in cells)
-1
```

Meaning of the options for treatment of data:

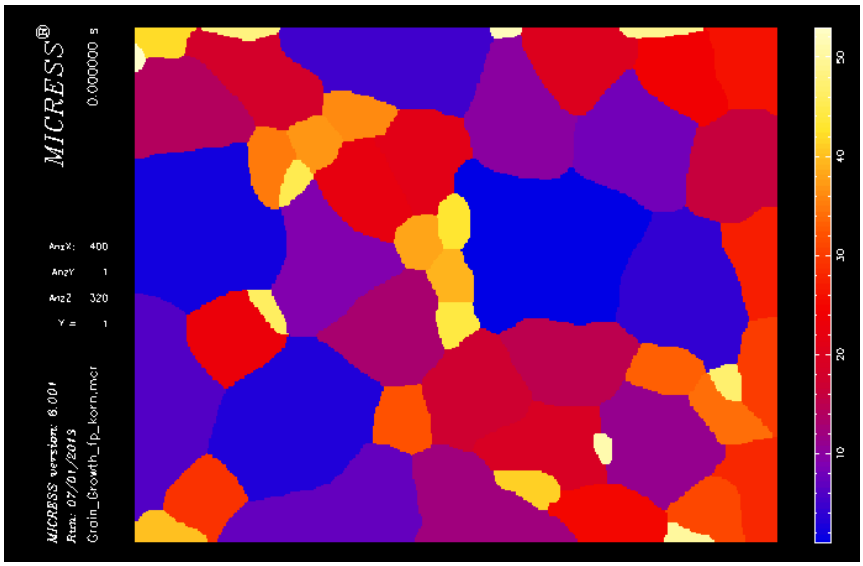
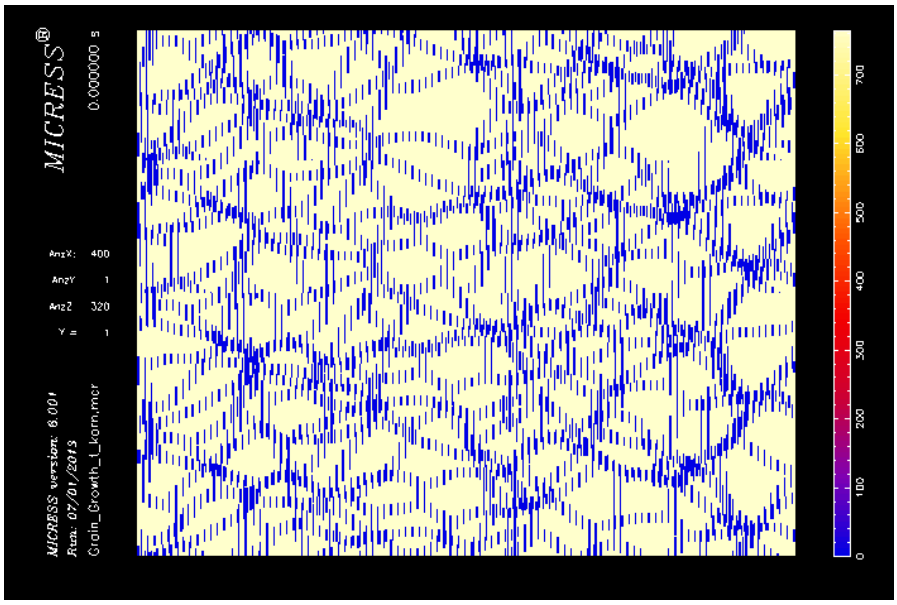
none: restores the black and white image in the grain output…all grains have the same value/grain number:



“ p”phase to grains: assigns an individual grain number to each closed region:



f: flip (here in conjunction with and „phase to grains“ “fp”): switches bottom <-> top



transpose „t“: transposes x- and z- columns/rows of the picture. This operation is meaningful only for square-pictures or if columns and rows are switched by other operations before