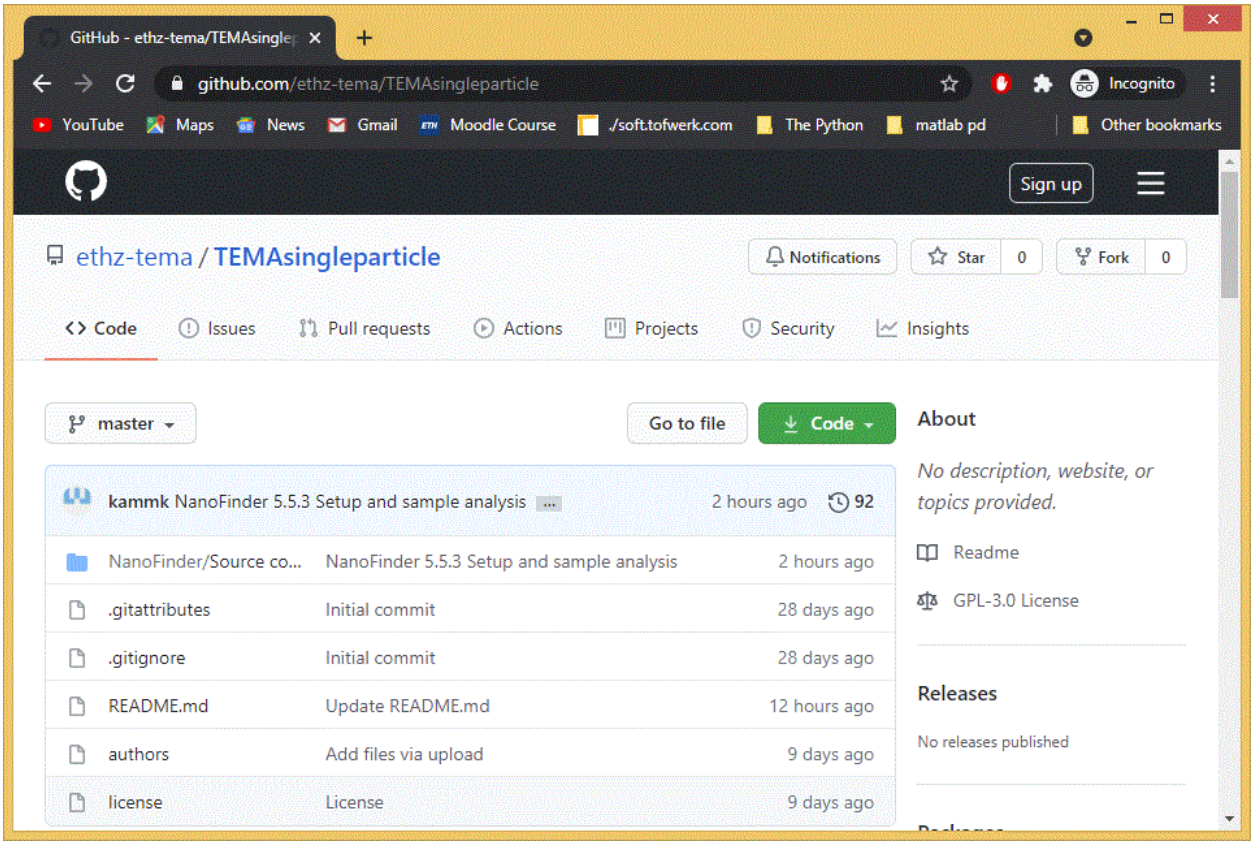
Step by step Installation and use of NanoFinder

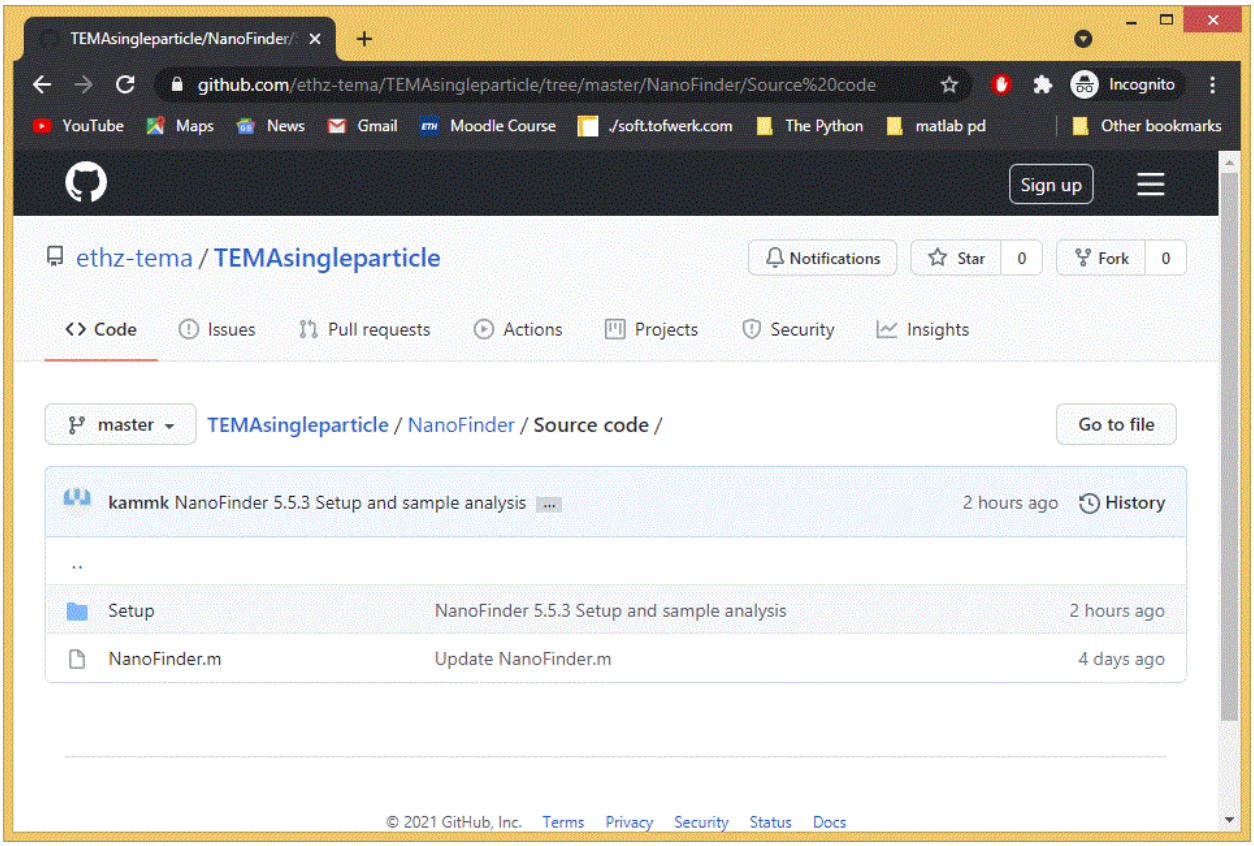
Author: Kamyar Merabai: kamyarm@ethz.ch

Installation:

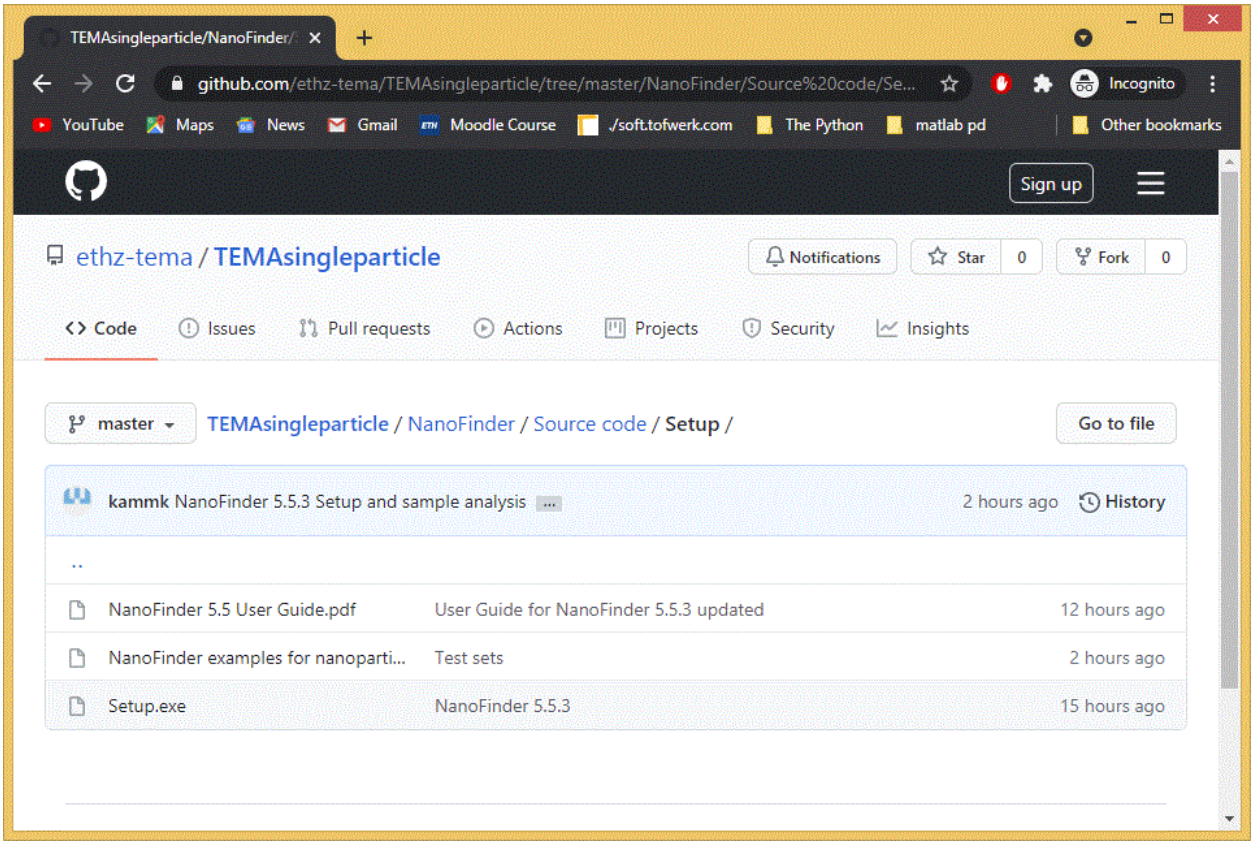
1. Please go to the link below and download the **Setp.exe** and **NanoFinder examples for nanoparticle analysis.zip**

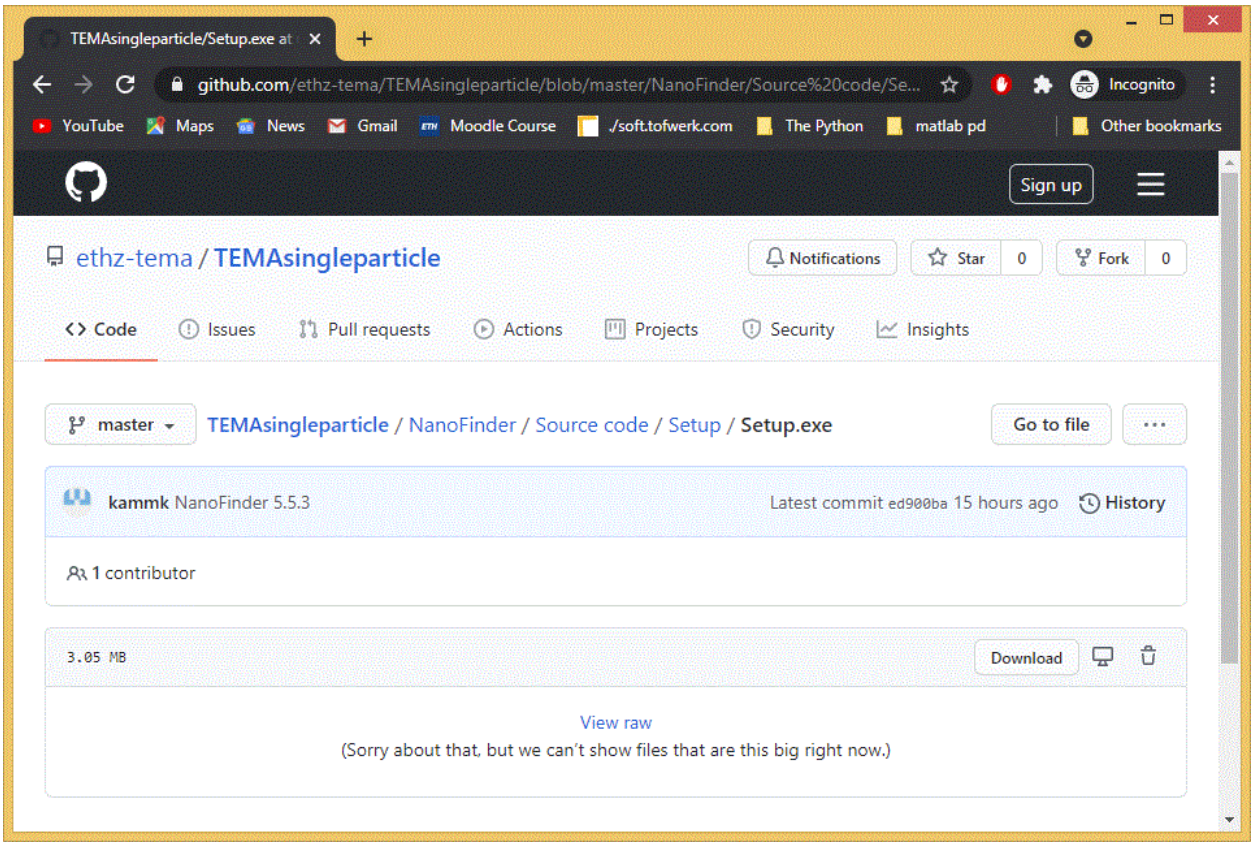
Link: https://github.com/ethz-tema/TEMAsingleparticle



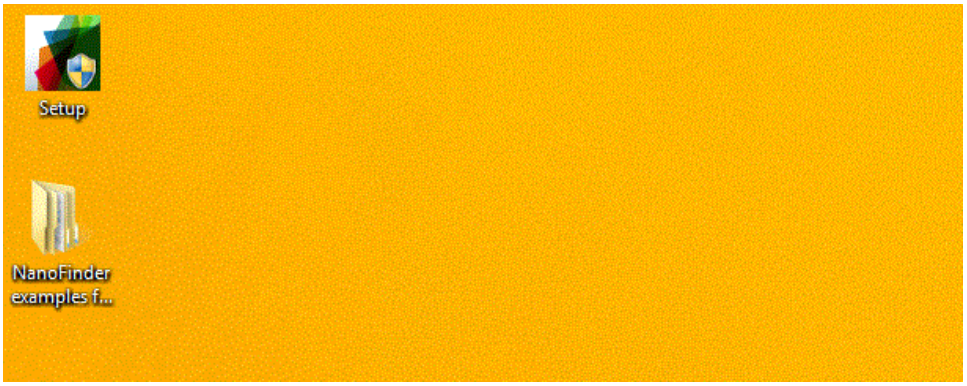


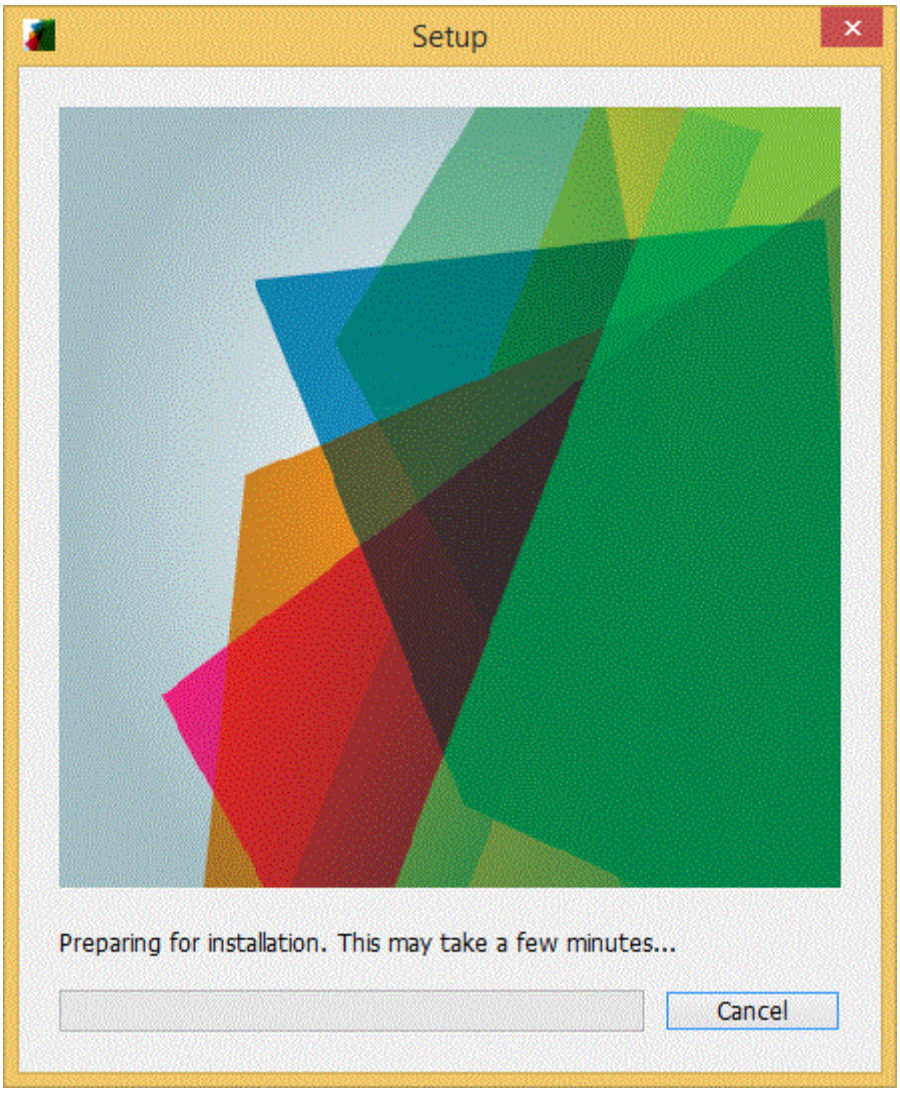
Here you can also **NanoFinder User guide.pdf** for setting up your analysis and insight on processed data.

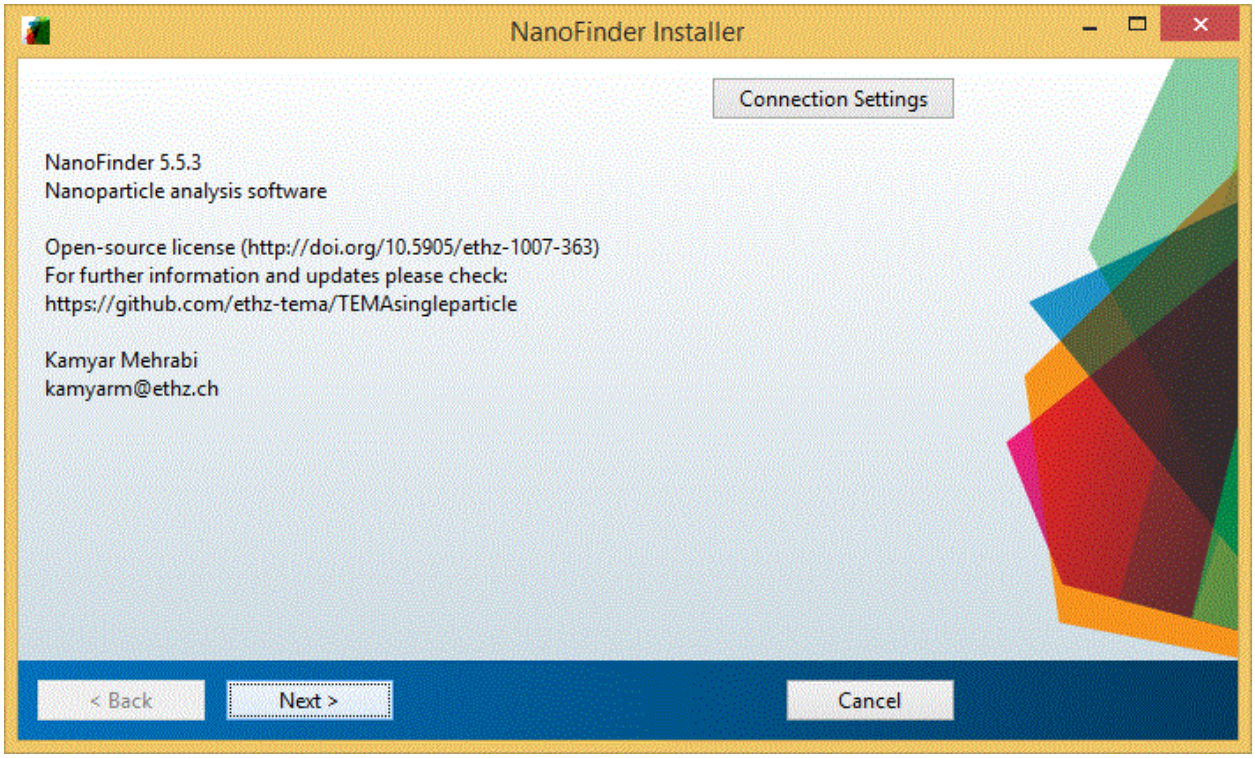




2. Run the setup.exe




Setup
Preparing for installation. This may take a few minutes...
Cancel


NanoFinder Installer
Connection Settings
NanoFinder 5.5.3
Nanoparticle analysis software
Open-source license (http://doi.org/10.5905/ethz-1007-363)
For further information and updates please check:
https://github.com/ethz-tema/TEMAsingleparticle
Kamyar Mehrabi
kamyarm@ethz.ch
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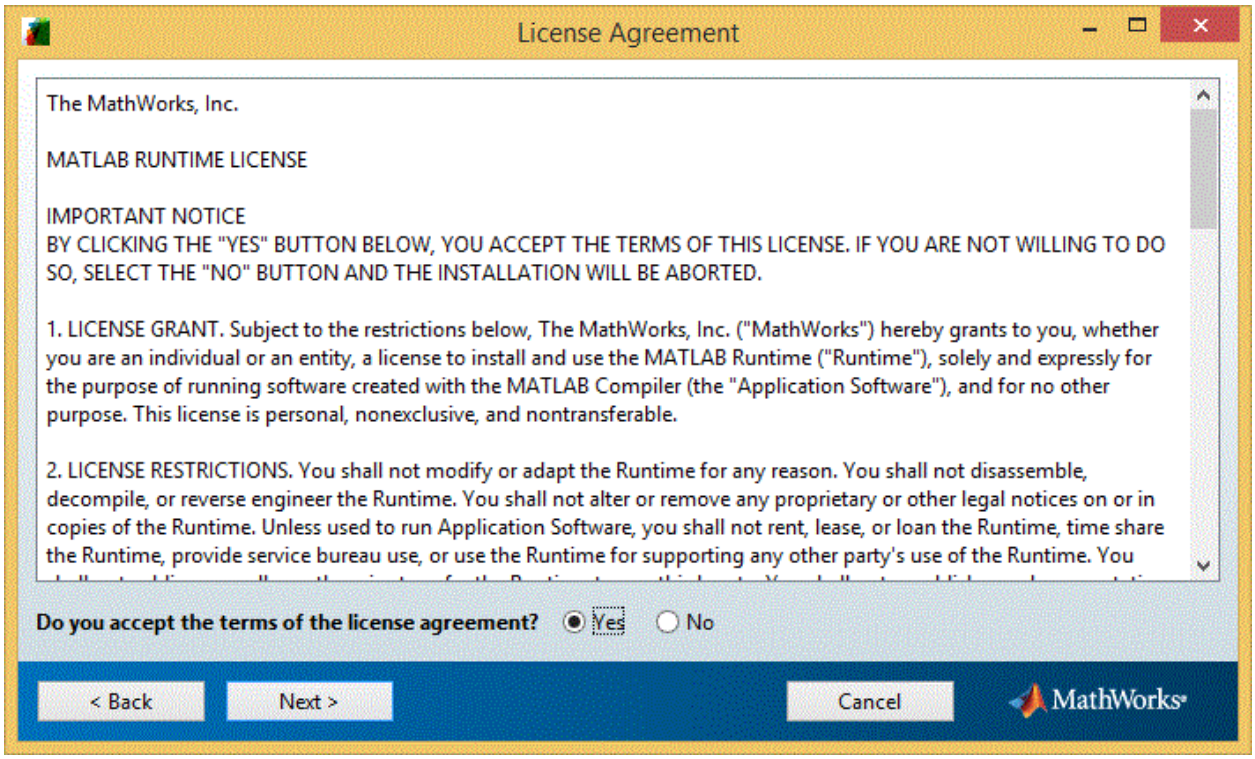
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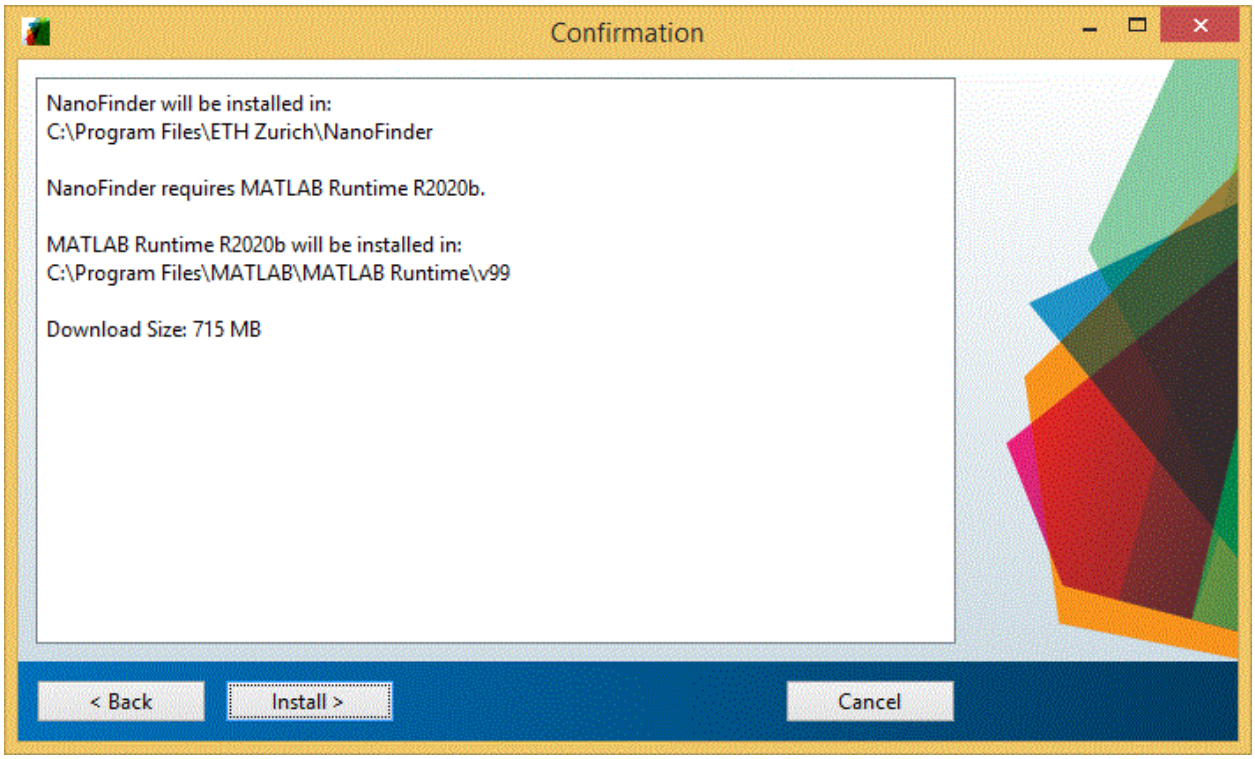
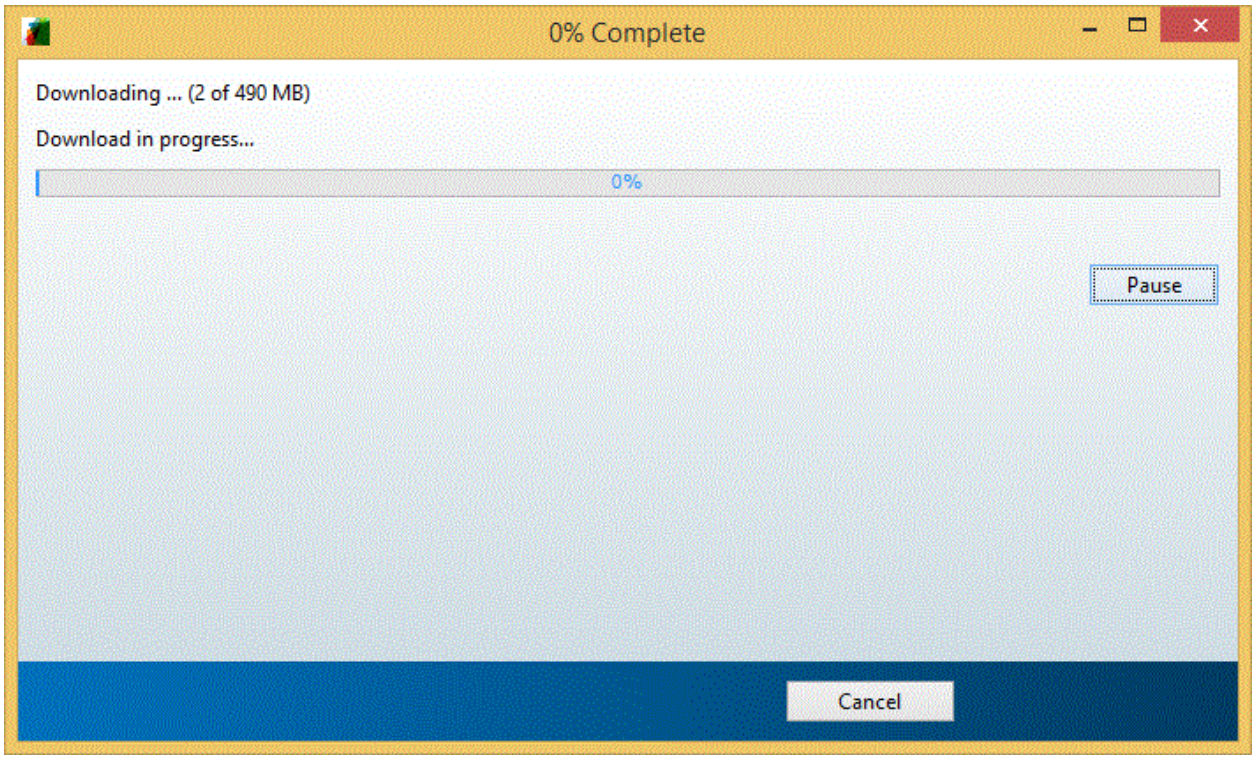
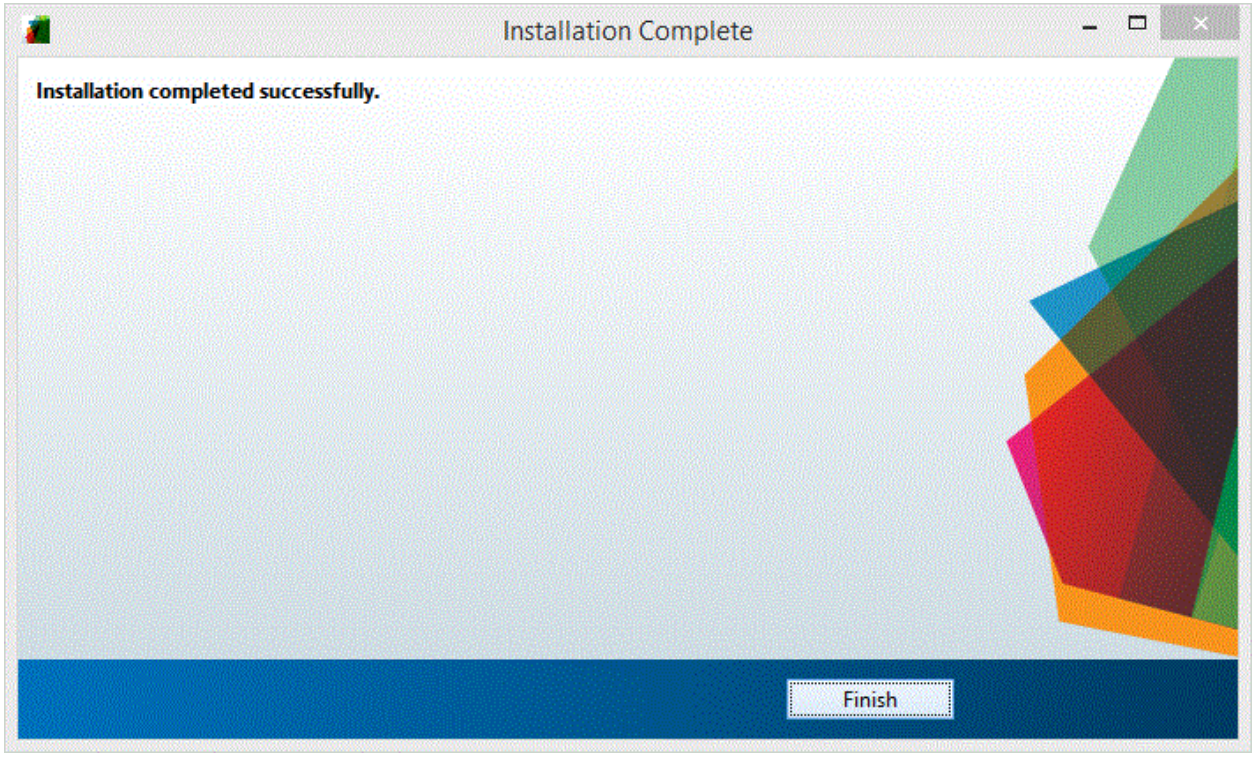

Confirmation
NanoFinder will be installed in:
C:\Program Files\ETH Zurich\NanoFinder
NanoFinder requires MATLAB Runtime R2020b.
MATLAB Runtime R2020b will be installed in:
C:\Program Files\MATLAB\MATLAB Runtime\v99
Download Size: 715 MB
< Back
Install >
Cancel





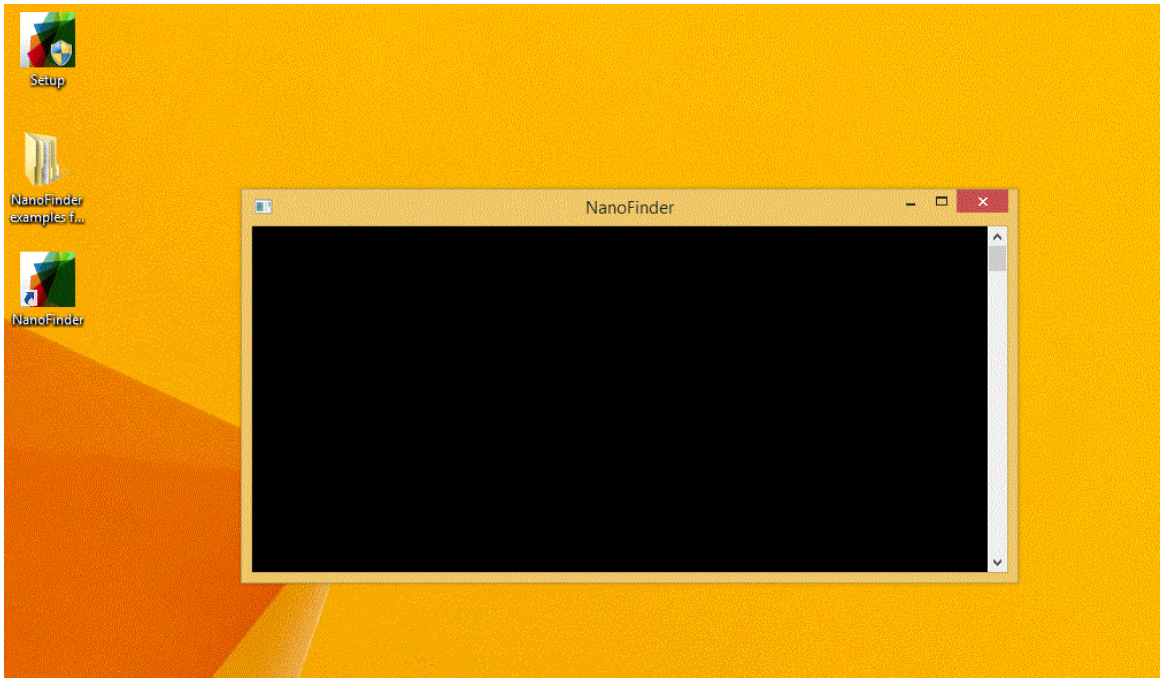
3. Search for NanoFinder in your programs directory and copy a shortcut of your program in Desktop or any other location.

Processing the test sample:

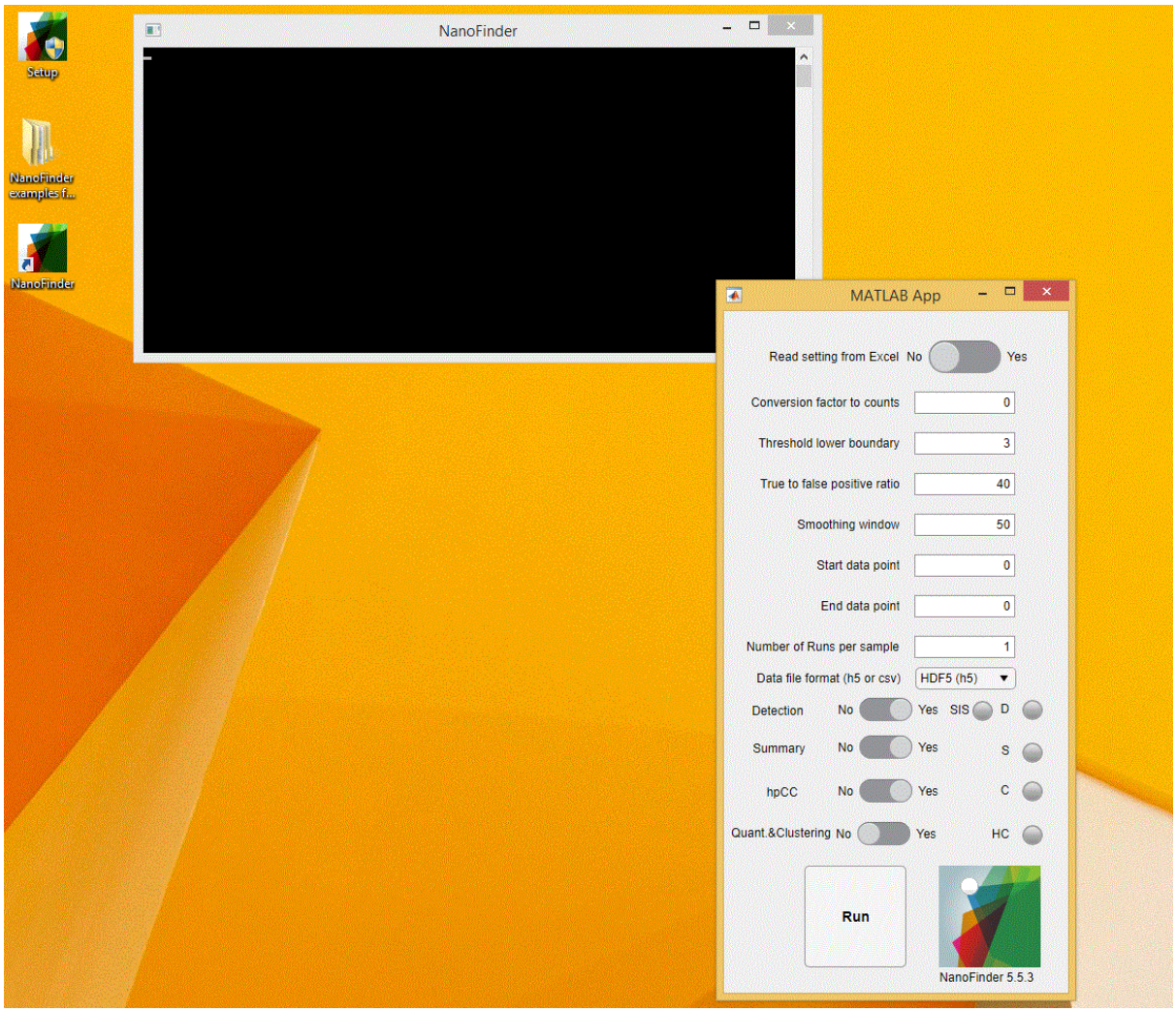
Example test data could be obtained form:

https://polybox.ethz.ch/index.php/s/jjsf2ozlUjEiC6t

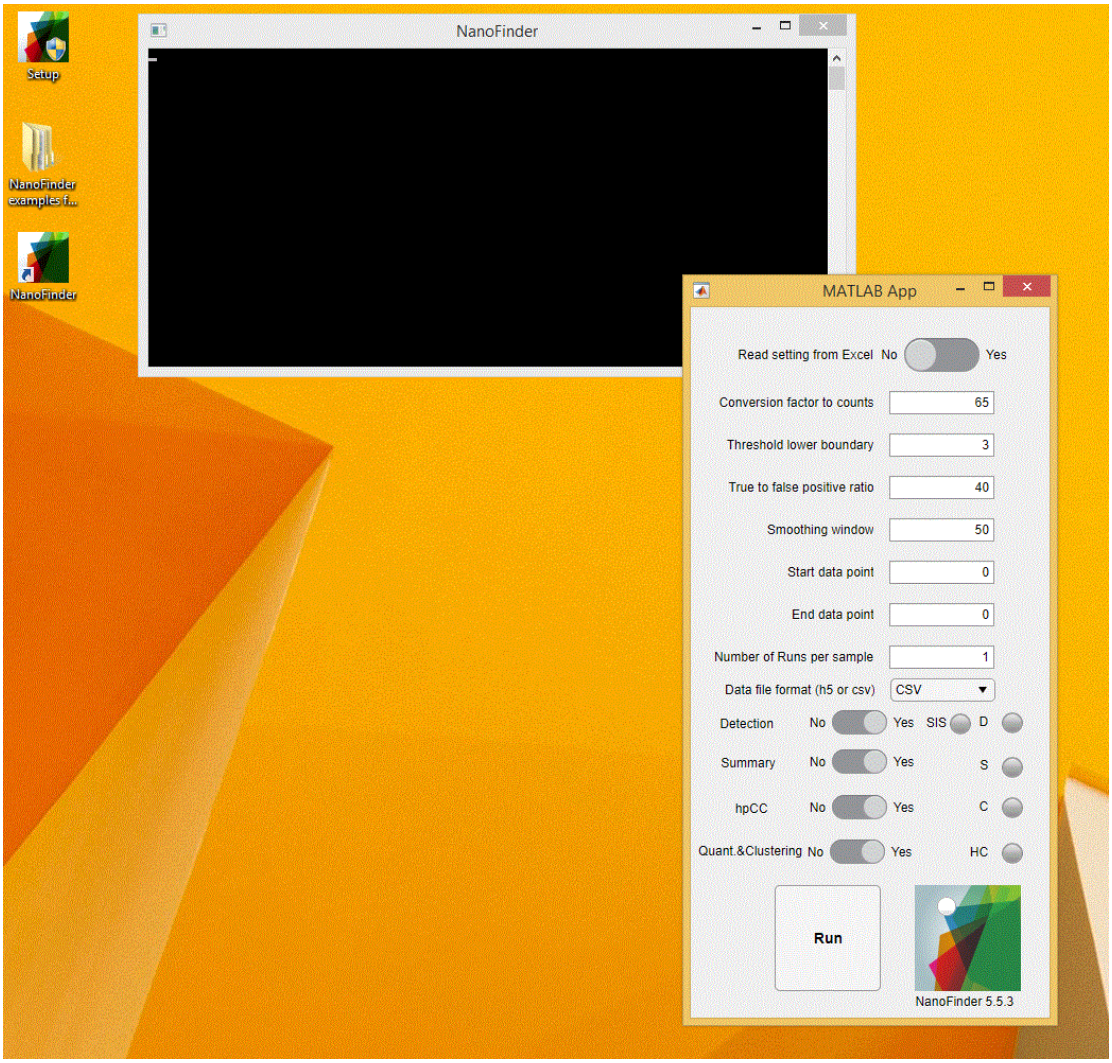
1. Open the NanoFinder program
2. A terminal window will show up shortly after



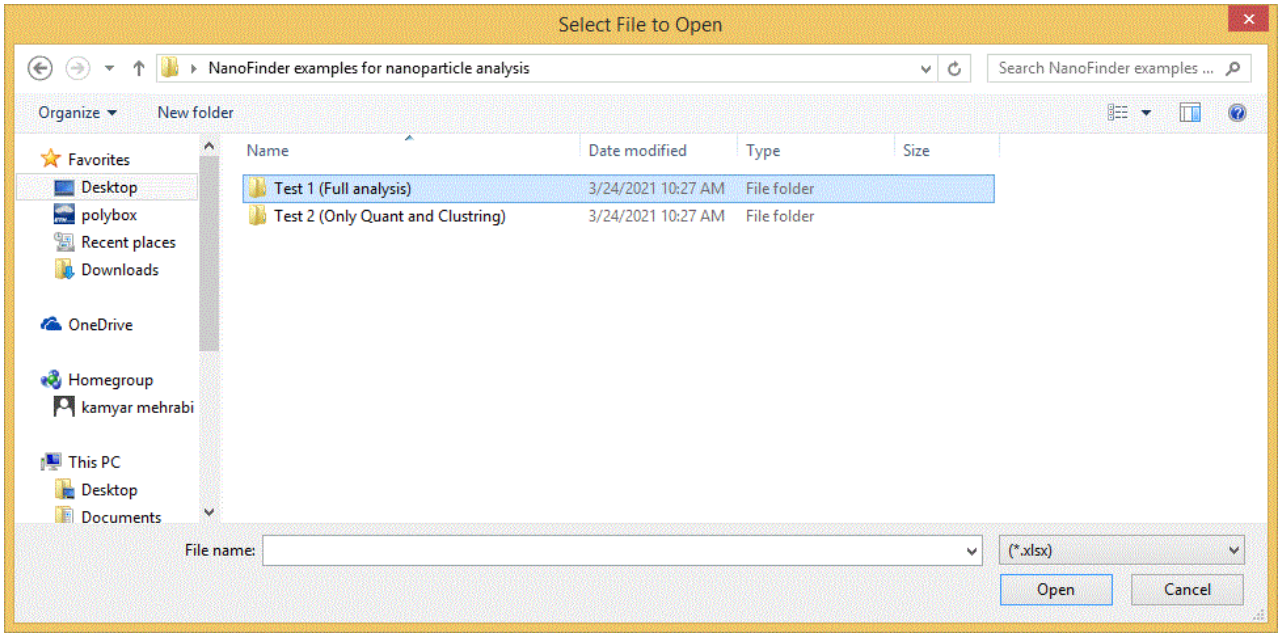
3. Wait until the program graphical user interface (GUI) open. It might take a few seconds to minutes depending on the processing power of your computer.

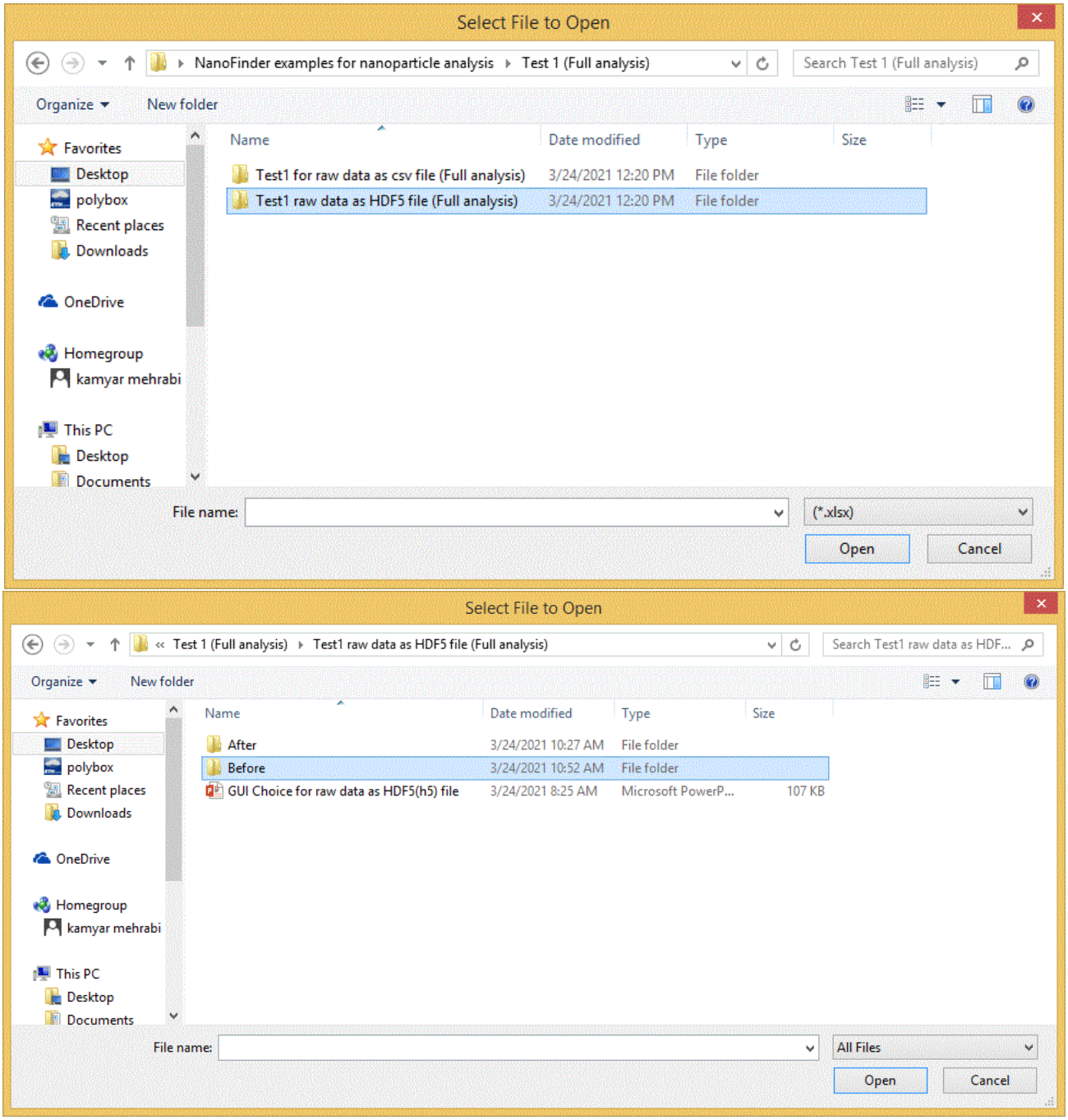


4. Fill in the GUI as shown in the NanoFinder test folder PowerPoint file. Here we try to process the **Test 1 HDF5 file and read setting from GUI** as well, so the GUI will look like the following after we fill it correctly

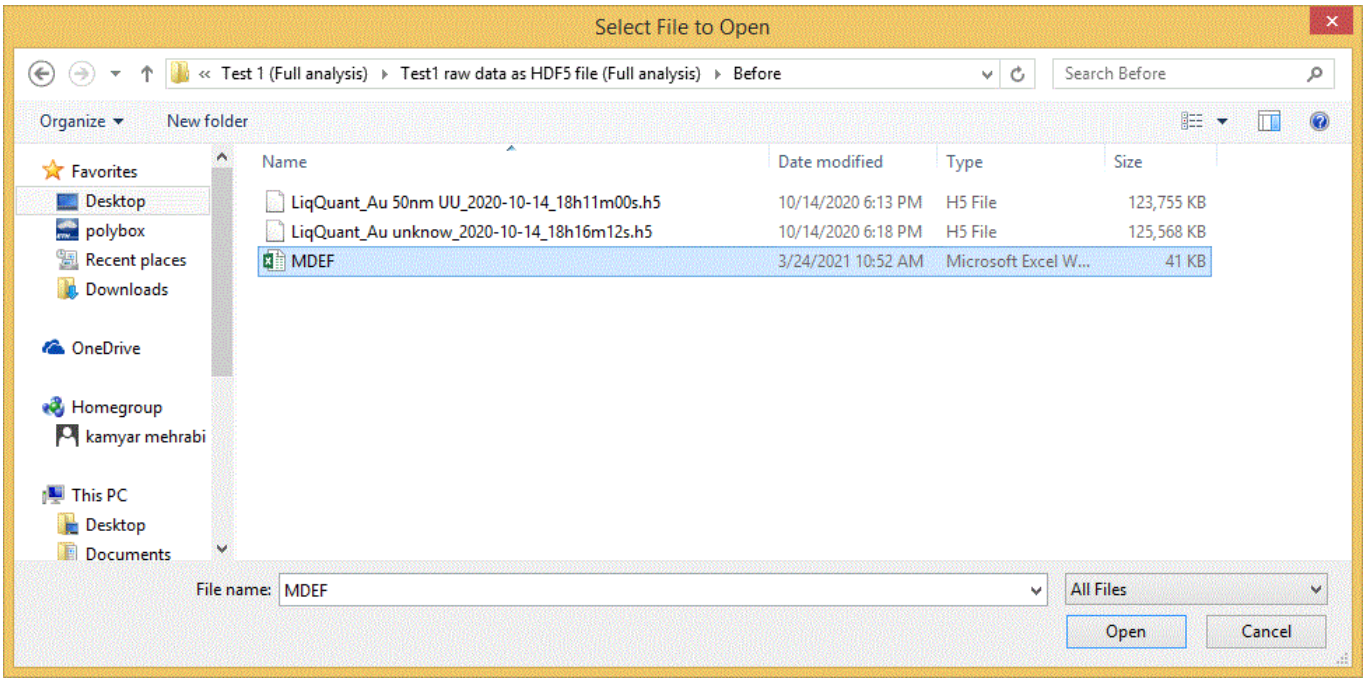


5. After you fill the GUI, press Run. Then a file browser will popup. direct the file browser to the location of your raw data directory, where you also copied the MDEF.xlsx.





6. Here we want to process the **Test1 raw data as HDF5 file**. In that folder go to the **Before** file and **open MDEF.xlsx**

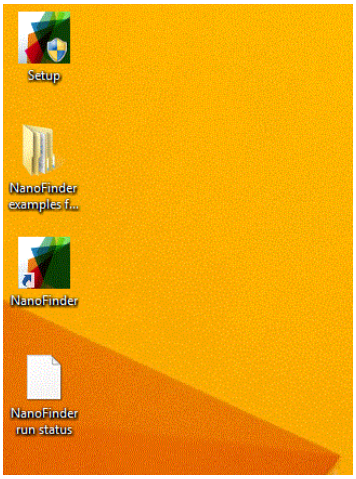


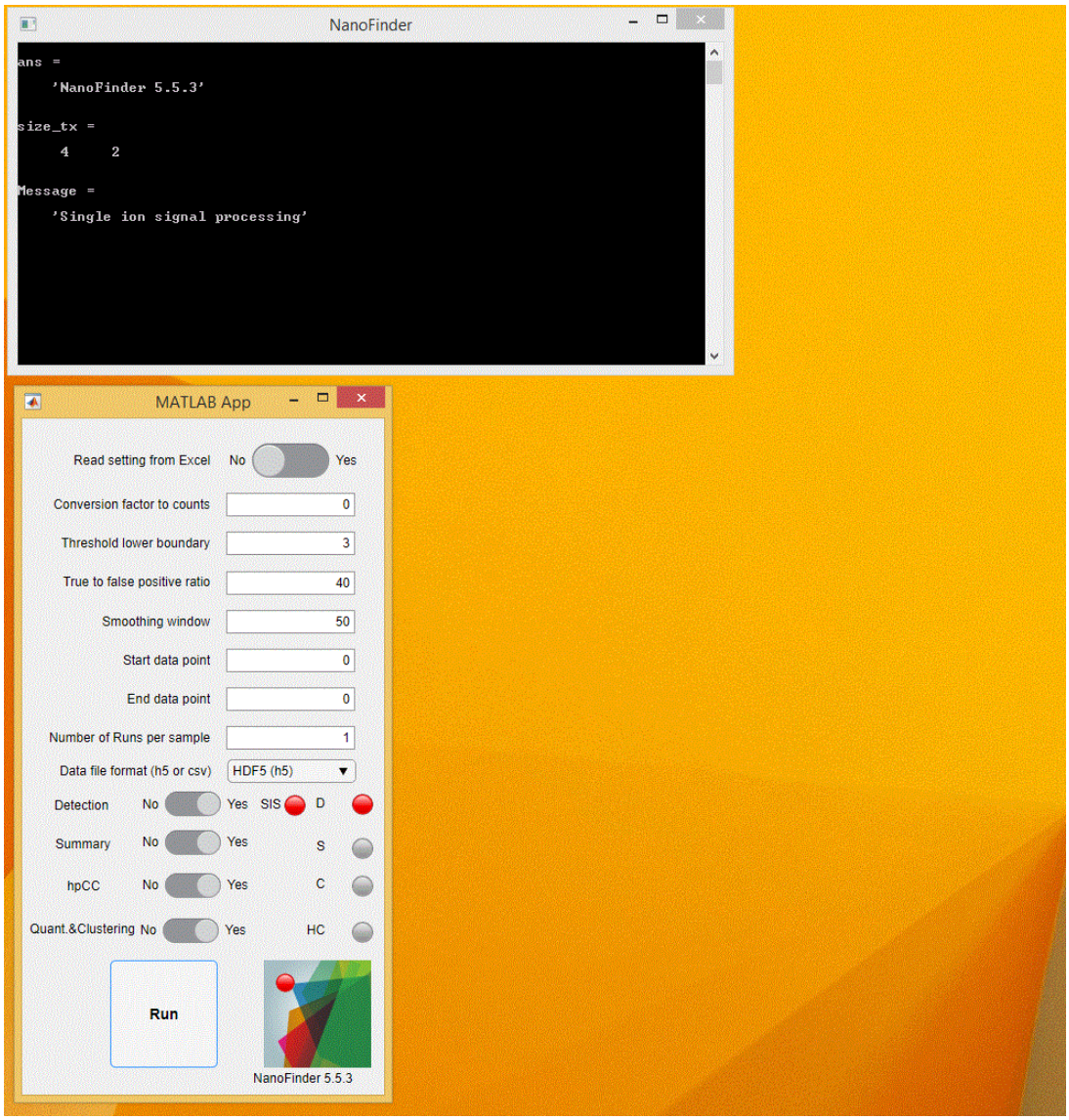
7. Program start processing as following screenshots is showing.

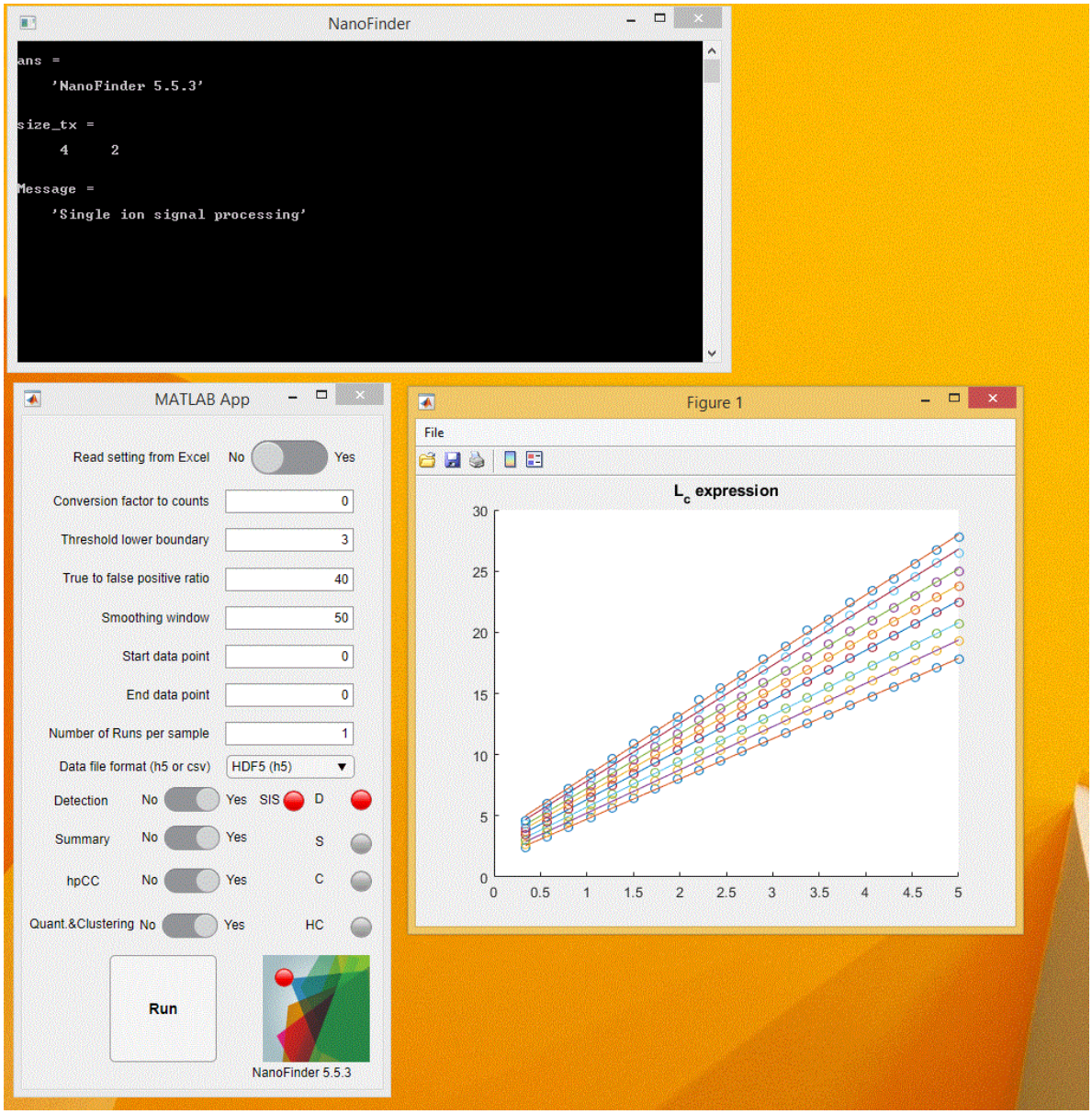
The terminal window, indicator lights in GUI, and popup chart will inform you about the latest analysis that is being done.

*While the program is processing, it is highly recommended to prevent using Excel, since the program is using it and error may be raised.

In case any error happens, see the terminal error and read about the error more carefully. In case the error is not solved, an Email may be sent with **Nanofinder run status** file attached to it. The Naofinder run status is generated as soon as you open the Nanofinder program and it is saved at the location of your program. It contains the same data as shown in the terminal window.




NanoFinder
ans =
'NanoFinder 5.5.3'
size_tx =
4 2
Message =
'Single ion signal processing'
MATLAB App
Read setting from Excel
No
Yes
Conversion factor to counts
0
Threshold lower boundary
3
True to false positive ratio
40
Smoothing window
50
Start data point
0
End data point
0
Number of Runs per sample
1
Data file format (h5 or csv)
HDF5 (h5)
Detection
No
Yes
SIS
D
Summary
No
Yes
S
hpCC
No
Yes
C
Quant.&Clustering
No
Yes
HC
Run
NanoFinder 5.5.3


NanoFinder
ans =
'NanoFinder 5.5.3'
size_tx =
4 2
Message =
'Single ion signal processing'
MATLAB App
Read setting from Excel
No
Yes
Conversion factor to counts
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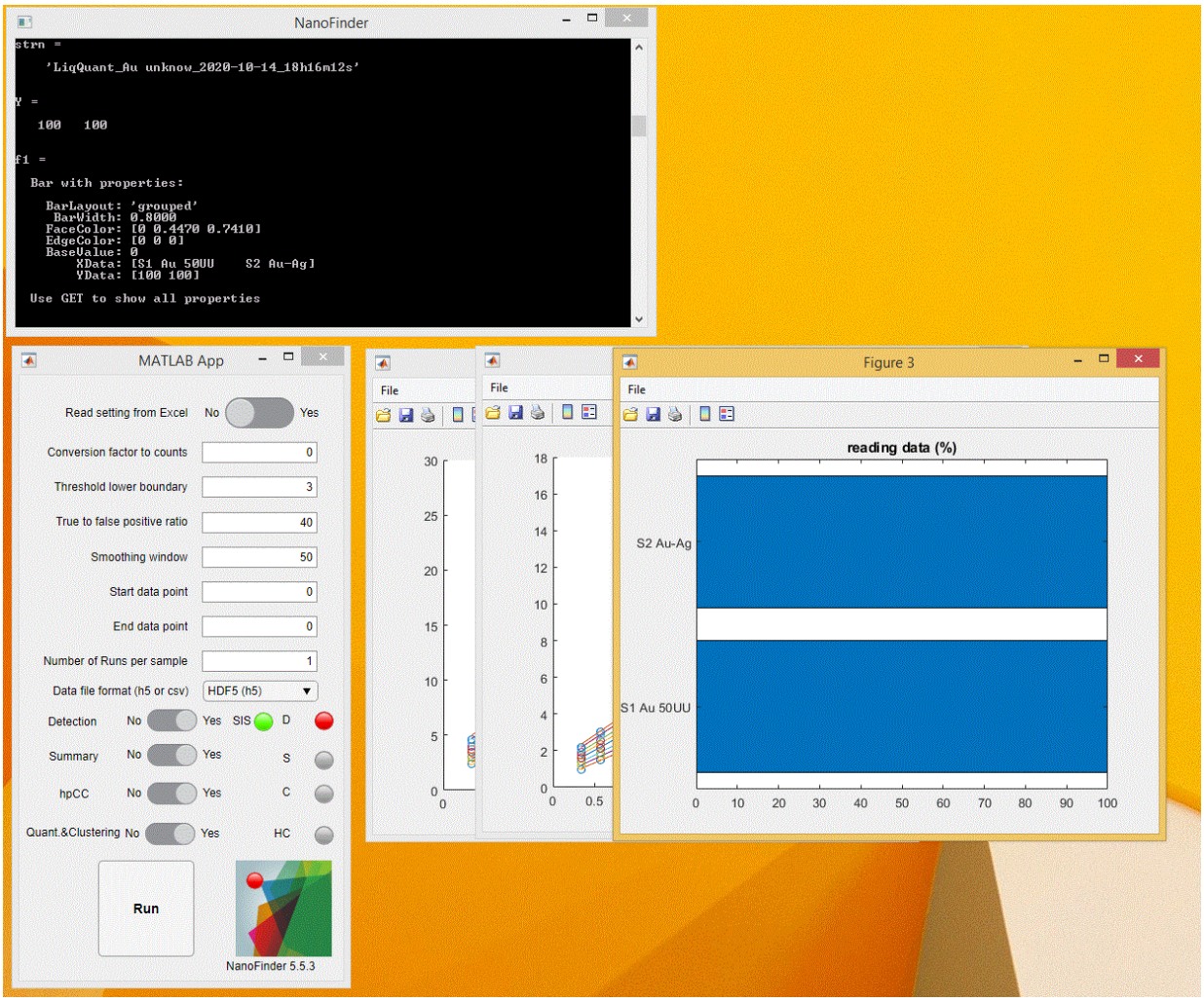
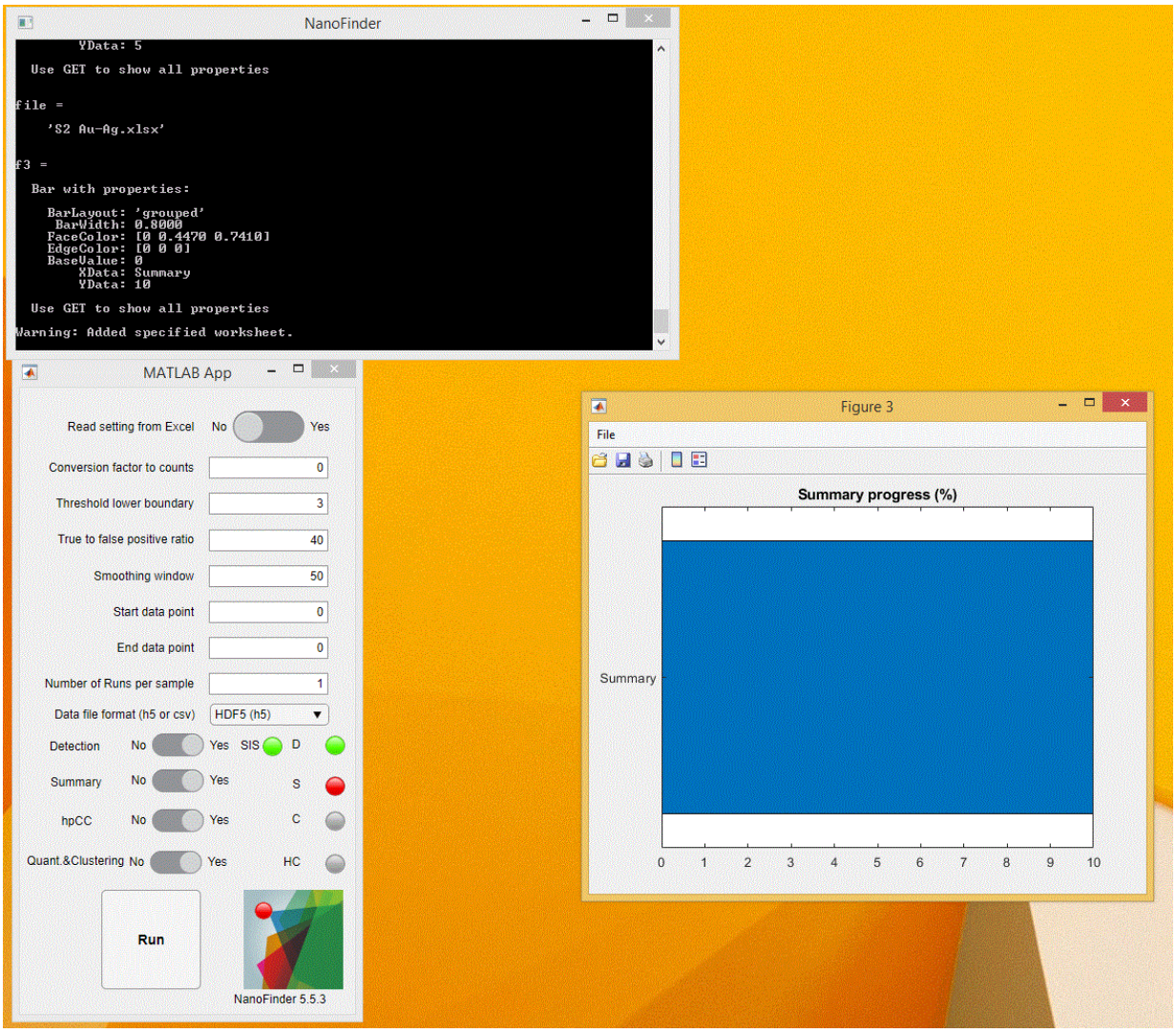
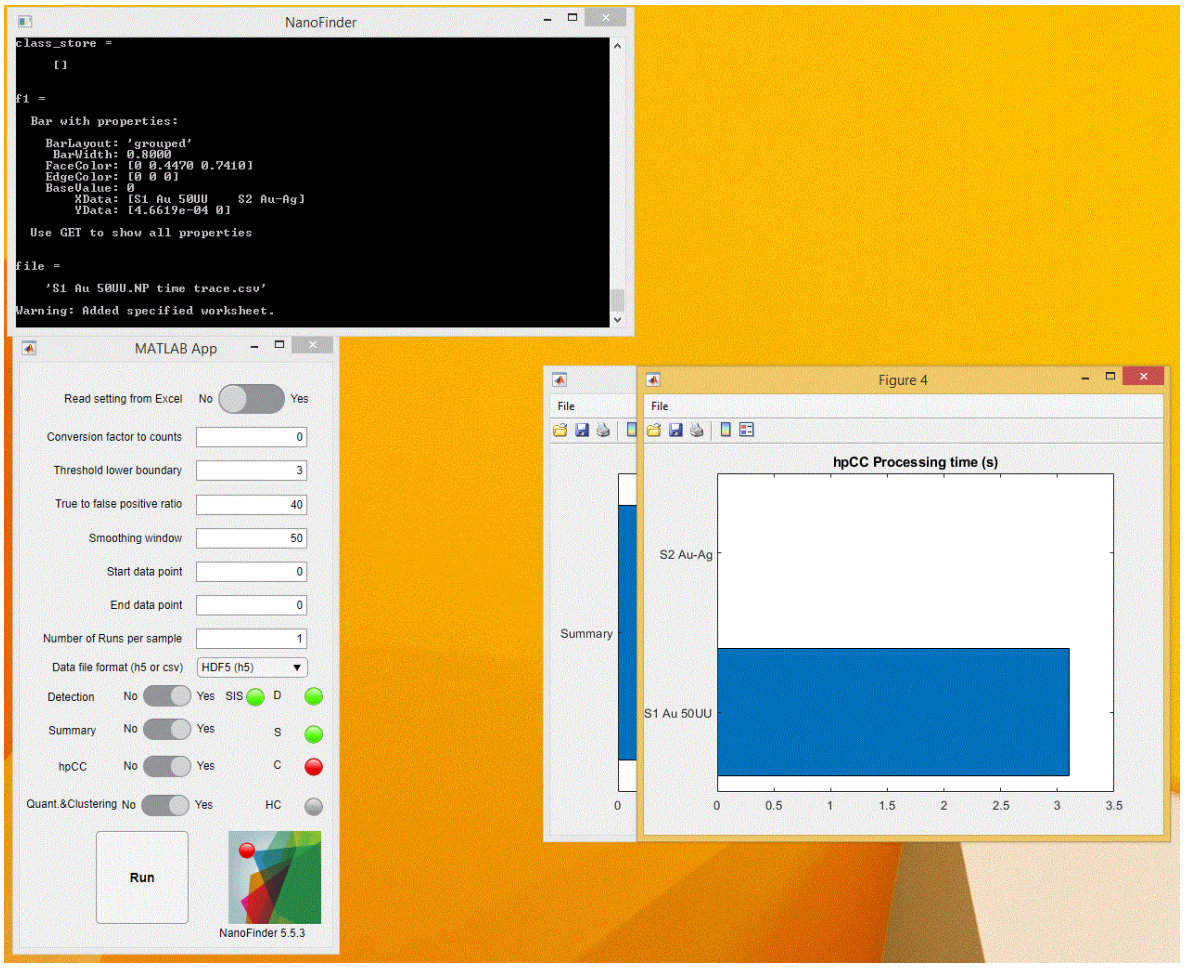
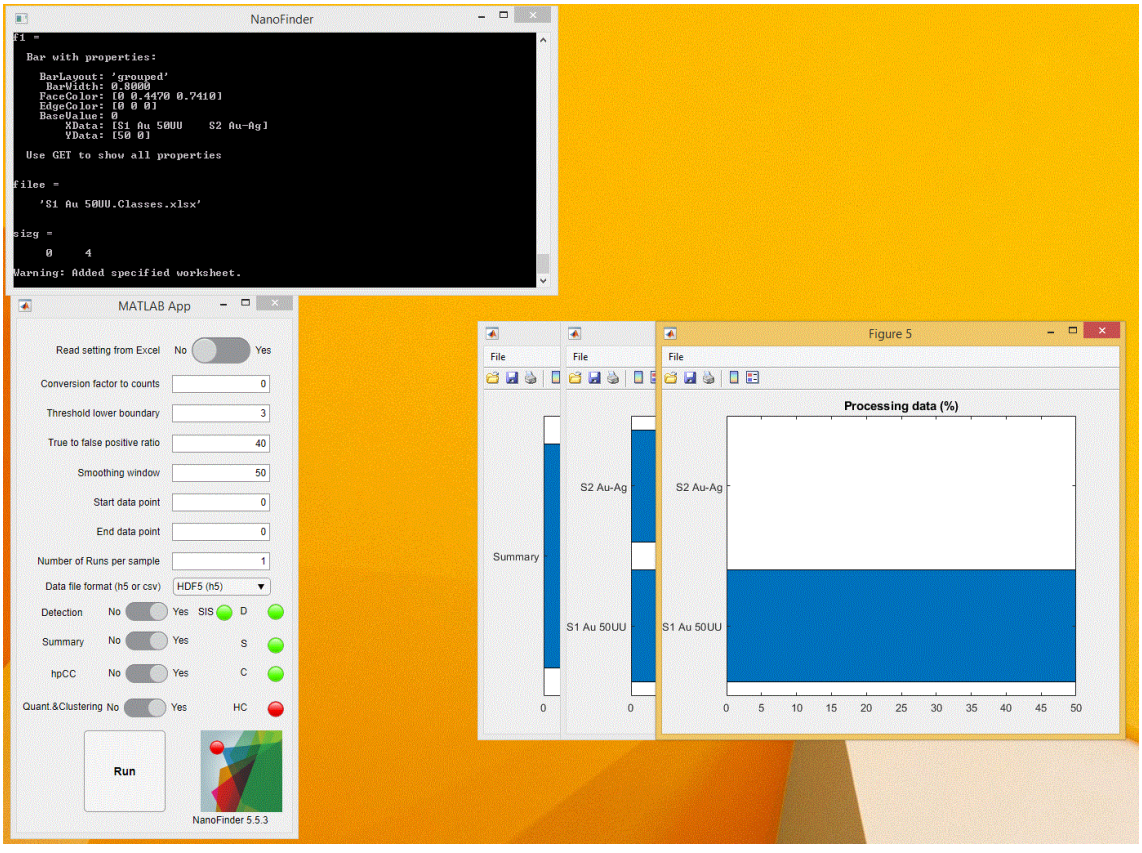
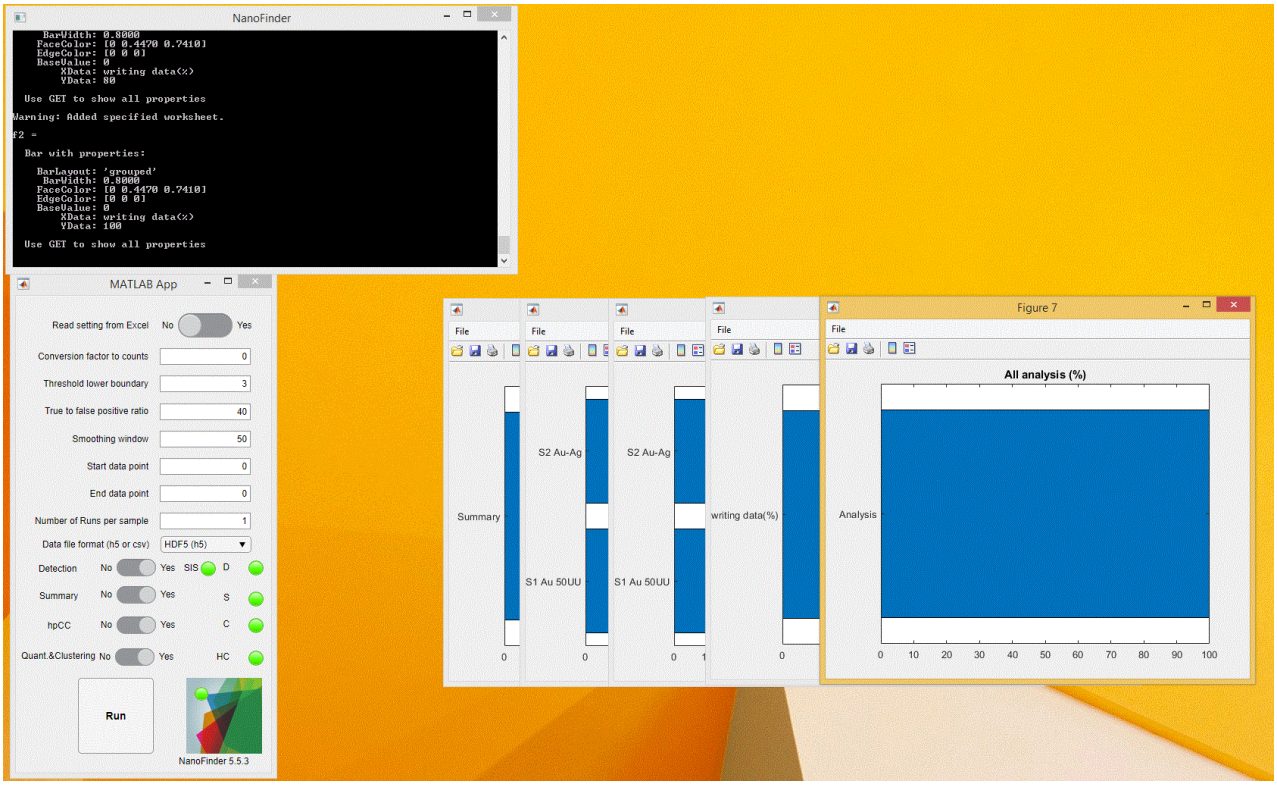
50
Start data point
0
End data point
0
Number of Runs per sample
1
Data file format (h5 or csv)
HDF5 (h5)
Detection
No
Yes
SIS
D
Summary
No
Yes
S
hpCC
No
Yes
C
Quant.&Clustering
No
Yes
HC
Run
NanoFinder 5.5.3
Figure 1
File
L_c expression
30
25
20
15
10
5
0
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5


NanoFinder
strn =
'LiqQuant_Au unknow_2020-10-14_18h16m12s'
Y =
100 100
f1 =
Bar with properties:
BarLayout: 'grouped'
BarWidth: 0.8000
FaceColor: [0 0.4470 0.7410]
EdgeColor: [0 0 0]
BaseValue: 0
XData: [S1 Au 50UU S2 Au-Ag]
YData: [100 100]
Use GET to show all properties
MATLAB App
Read setting from Excel
No
Yes
Conversion factor to counts
0
Threshold lower boundary
3
True to false positive ratio
40
Smoothing window
50
Start data point
0
End data point
0
Number of Runs per sample
1
Data file format (h5 or csv)
HDF5 (h5)
Detection
SIS
D
Summary
S
hpCC
C
Quant.&Clustering
HC
Run
NanoFinder 5.5.3
File
Figure 3
reading data (%)
S2 Au-Ag
S1 Au 50UU

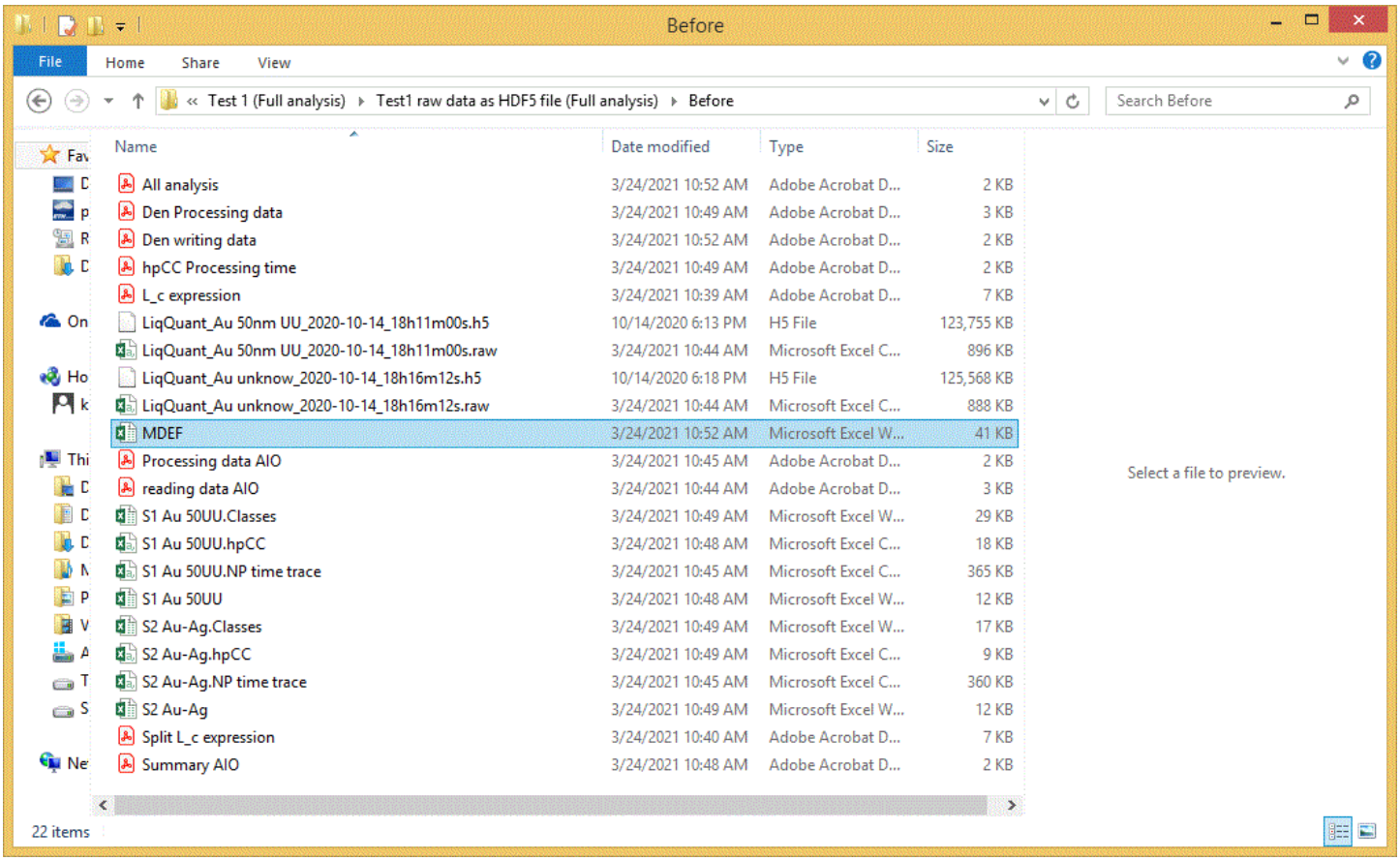

NanoFinder
YData: 5
Use GET to show all properties
file =
'S2 Au-Ag.xlsx'
f3 =
Bar with properties:
BarLayout: 'grouped'
BarWidth: 0.8000
FaceColor: [0 0.4470 0.7410]
EdgeColor: [0 0 0]
BaseValue: 0
XData: Summary
YData: 10
Use GET to show all properties
Warning: Added specified worksheet.
MATLAB App
Read setting from Excel
No
Yes
Conversion factor to counts
0
Threshold lower boundary
3
True to false positive ratio
40
Smoothing window
50
Start data point
0
End data point
0
Number of Runs per sample
1
Data file format (h5 or csv)
HDF5 (h5)
Detection
No
Yes
SIS
D
Summary
No
Yes
S
hpCC
No
Yes
C
Quant.&Clustering
No
Yes
HC
Run
NanoFinder 5.5.3
Figure 3
File
Summary progress (%)
Summary
0
1
2
3
4
5
6
7
8
9
10


NanoFinder
class_store =
[]
f1 =
Bar with properties:
BarLayout: 'grouped'
BarWidth: 0.8000
FaceColor: [0 0.4470 0.7410]
EdgeColor: [0 0 0]
BaseValue: 0
XData: [S1 Au 50UU S2 Au-Ag]
YData: [4.6619e-04 0]
Use GET to show all properties
file =
'S1 Au 50UU.NP time trace.csv'
Warning: Added specified worksheet.
MATLAB App
Read setting from Excel No Yes
Conversion factor to counts 0
Threshold lower boundary 3
True to false positive ratio 40
Smoothing window 50
Start data point 0
End data point 0
Number of Runs per sample 1
Data file format (h5 or csv) HDF5 (h5)
Detection No Yes SIS D
Summary No Yes S
hpCC No Yes C
Quant.&Clustering No Yes HC
Run
NanoFinder 5.5.3
Figure 4
File
hpCC Processing time (s)
S2 Au-Ag
S1 Au 50UU
Summary
0
0.5
1
1.5
2
2.5
3
3.5


NanoFinder
f1 =
Bar with properties:
BarLayout: 'grouped'
BarWidth: 0.8000
FaceColor: [0 0.4470 0.7410]
EdgeColor: [0 0 0]
BaseValue: 0
XData: [S1 Au 50UU S2 Au-Ag]
YData: [50 0]
Use GET to show all properties
filee =
'S1 Au 50UU.Classes.xlsx'
sizg =
0 4
Warning: Added specified worksheet.
MATLAB App
Read setting from Excel No Yes
Conversion factor to counts 0
Threshold lower boundary 3
True to false positive ratio 40
Smoothing window 50
Start data point 0
End data point 0
Number of Runs per sample 1
Data file format (h5 or csv) HDF5 (h5)
Detection No Yes SIS D
Summary No Yes S
hpCC No Yes C
Quant.&Clustering No Yes HC
Run
NanoFinder 5.5.3
Figure 5
File
Processing data (%)
S2 Au-Ag
S1 Au 50UU
Summary
0
5
10
15
20
25
30
35
40
45
50



8. After all processing is done, you could access the processed data in the same directory as your raw data input.



9. For more information and a guide on how to set up your analysis please go to the GitHub folder and find the Nanofinder user guide in the same directory as Setup.exe.

References:

1. K. Mehrabi, R. Kaegi, D. Gunther and A. Gundlach-Graham, Emerging investigator series: Automated Single-Nanoparticle Quantification and Classification: A Holistic Study of Particles into and out of Wastewater Treatment Plants in Switzerland, *Environ. Sci.: Nano*, 2021, DOI: 10.1039/D0EN01066A.
2. A. Gundlach-Graham, L. Hendriks, K. Mehrabi and D. Gunther, Monte Carlo Simulation of Low-Count Signals in Time-of-Flight Mass Spectrometry and Its Application to Single-Particle Detection, *Anal. Chem.*, 2018, **90**, 11847-11855.
3. A. Gundlach-Graham and K. Mehrabi, Monodisperse microdroplets: a tool that advances single-particle ICP-MS measurements, *J. Anal. At. Spectrom.*, 2020, **35**, 1727-1739.
4. K. Mehrabi, D. Gunther and A. Gundlach-Graham, Single-particle ICP-TOFMS with online microdroplet calibration for the simultaneous quantification of diverse nanoparticles in complex matrices, *Environmental Science-Nano*, 2019, **6**, 3349-3358.