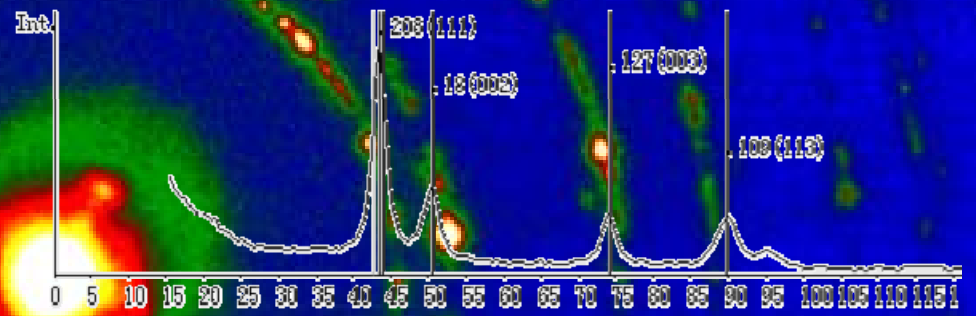
EDP2XRD

Version 1.0.0



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Instructions

- Specific description
- About the author
- Main functions
- Basic operation
- Acknowledgement

Specific description

Computer language:	Visual Basic 6.0
Core algorithm:	Robot vision
Knowledge background:	Crystal diffraction
Key technology:	Image processing
Script Line number:	5050
Running environment：	Windows9X/2000/xp/7 Operation system; 64 MB; inner memory; 50MBhard disk space

About the Author

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- Research field: Advanced materials preparing and characterization
- Affiliation: ACMM, The University of Sydney
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Main functions

- Convert electron diffraction pattern into X-ray diffraction pattern both in auto mode and manual mode
- Work for single or multiple crystalline crystal electron diffraction pattern
- Work for non-complete electron diffraction pattern

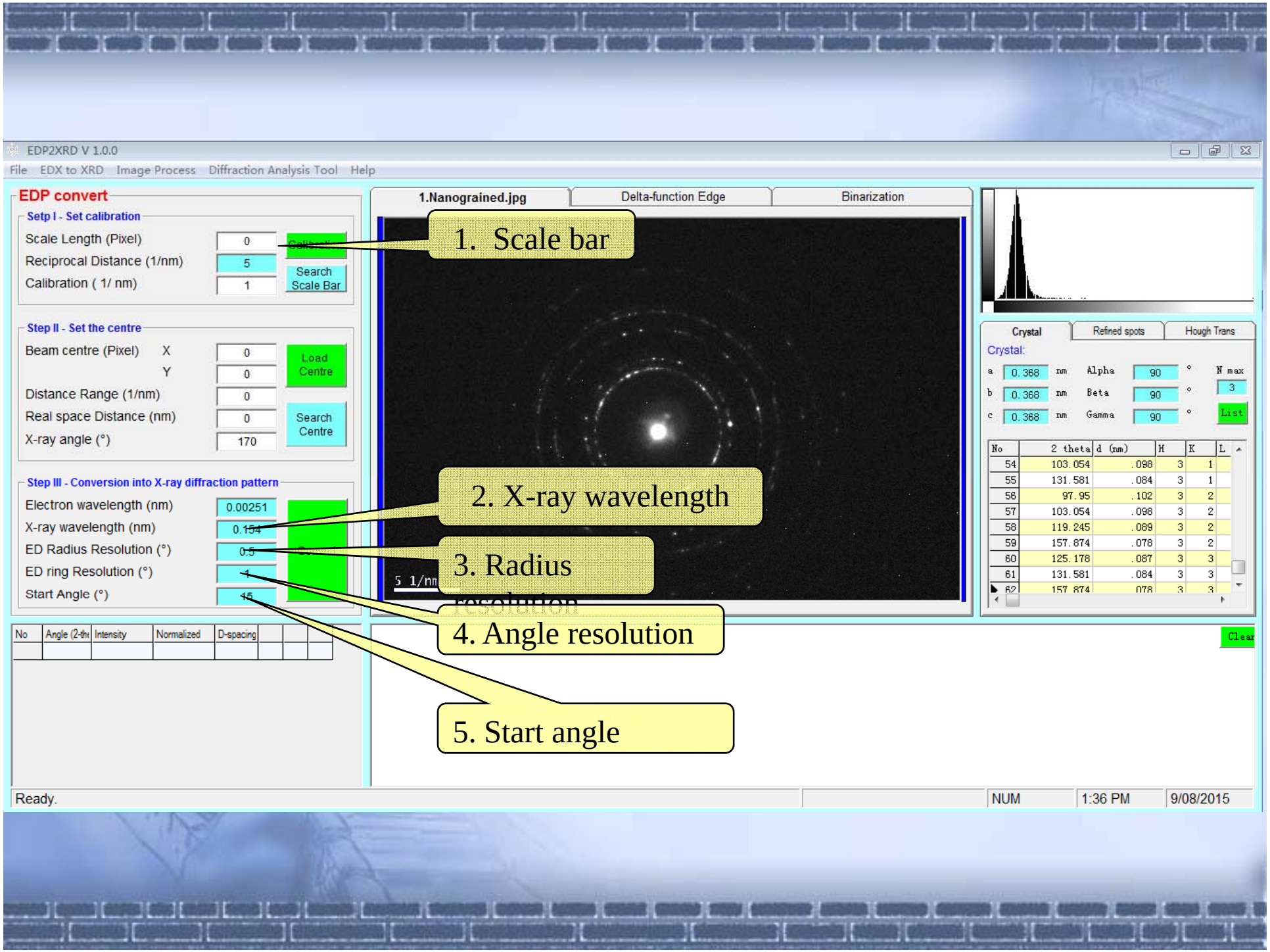
- Image processing for electron diffraction pattern
  - Histogram
  - Contrast inversion
  - Gradation conversion
  - Smoothing
  - Sharpening
  - Edge searching
  - Binarization
  - Scale bar searching
  - Circle centre searching

- Conversion parameters can be adjusted as per requirement
- Step-to-step conversion for non-complete election diffraction pattern
- One-key conversion is available if scale bar information is correct
- Generated X-ray pattern can be exported to TXT format which is applicable for X-ray pattern analysis software
- Crystalline information file (CIF) can be imported followed by d-spacing and diffraction angle calculation which is useful for peak searching and indexing

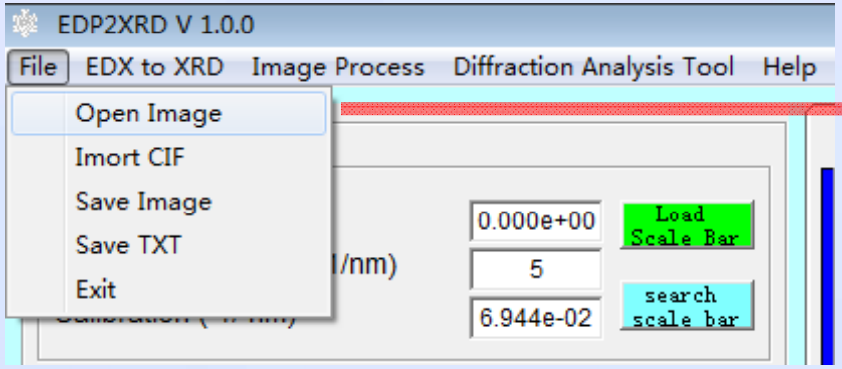
Operation

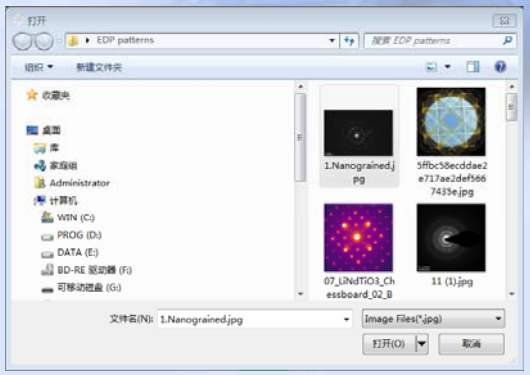
1. Set conversion parameters：
   - Input reciprocal scale bar (defaulted as 5)，unit is 1/nm;
   - Input X-ray wavelength (defaulted as 0.154)， unit is nm;
   - Input normal resolution (defaulted as 0.1)， unit is deg;
   - Input radius resolution (defaulted as 0.1)， unit is deg;
   - Input start angle (defaulted as 15)， unit is deg.

Remark: one-key conversion is available if all the above parameter have been set correctly.


EDP2XRD V 1.0.0
File EDX to XRD Image Process Diffraction Analysis Tool Help
EDP convert
Setp I - Set calibration
Scale Length (Pixel)
Reciprocal Distance (1/nm)
Calibration (1/ nm)
Search Scale Bar
Step II - Set the centre
Beam centre (Pixel) X
Y
Distance Range (1/nm)
Real space Distance (nm)
X-ray angle (°)
Load Centre
Search Centre
Step III - Conversion into X-ray diffraction pattern
Electron wavelength (nm)
X-ray wavelength (nm)
ED Radius Resolution (°)
ED ring Resolution (°)
Start Angle (°)
1.Nanograined.jpg
Delta-function Edge
Binarization
1. Scale bar
2. X-ray wavelength
3. Radius resolution
4. Angle resolution
5. Start angle
Crystal
Refined spots
Hough Trans
Crystal:
Alpha
Beta
Gamma
N max
List
No
2 theta
d (nm)
H
K
L
Clear
Ready.
NUM
1:36 PM
9/08/2015

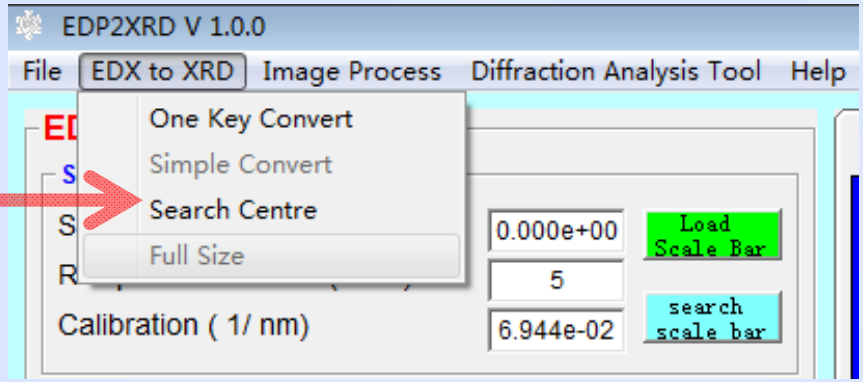
2. Open or drag JPG format image of electron diffraction pattern into Image frame area



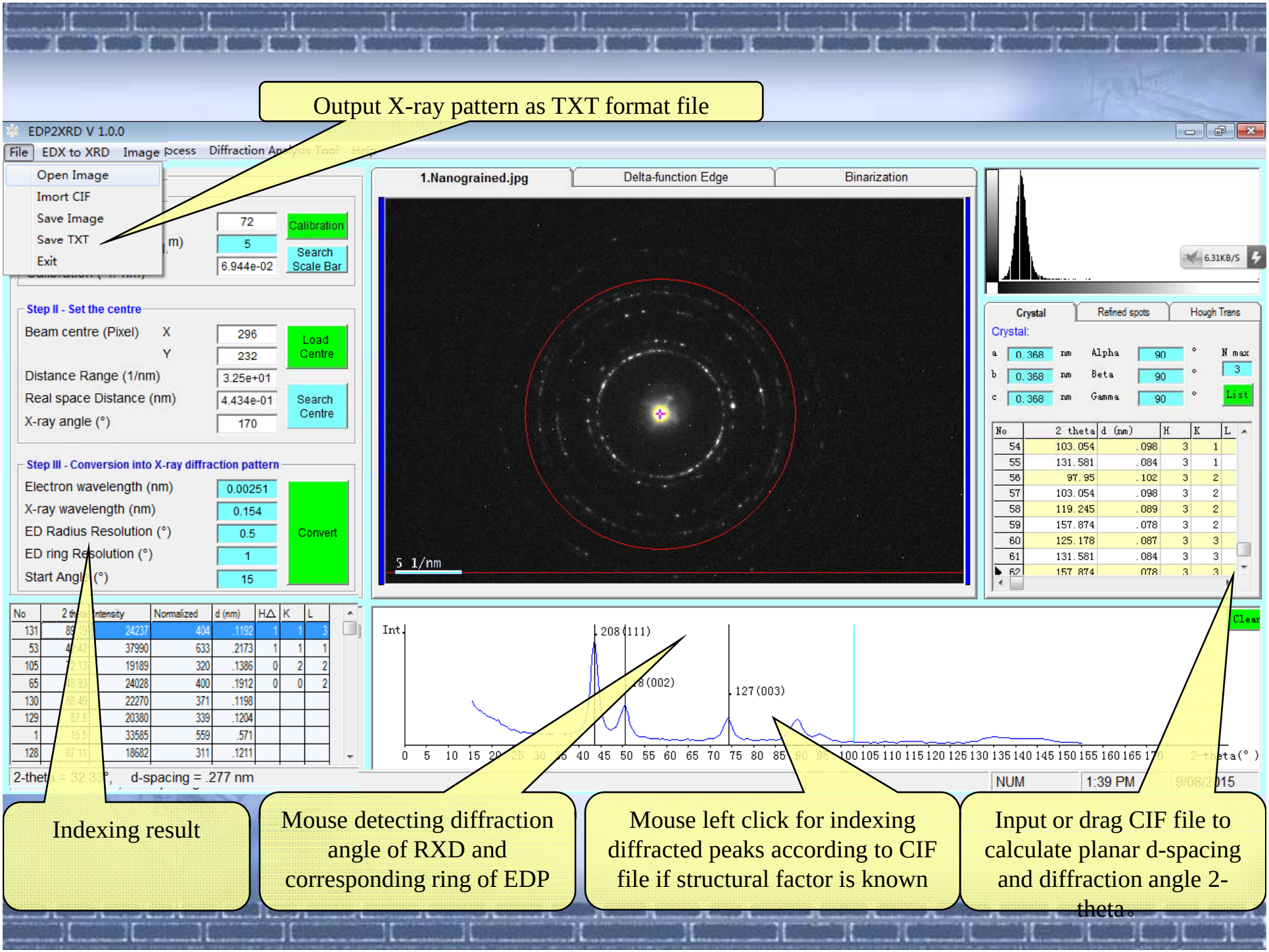


3. Auto Mode1：One-key conversion

- From Main menu → EDX to XRD → One Key Convert
- Wait until conversion finished.

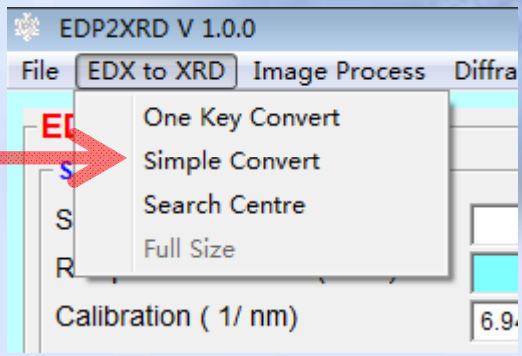


One-key conversion utilizes image processing for the pattern which contains lots of noise, low quality and non-apparent diffraction ring feature.


Output X-ray pattern as TXT format file
EDP2XRD V 1.0.0
File
EDX to XRD
Image
Diffraction Analysis Tool
Open Image
Imort CIF
Save Image
Save TXT
Exit
Calibration
Search Scale Bar
Step II - Set the centre
Beam centre (Pixel)
Load Centre
Distance Range (1/nm)
Real space Distance (nm)
Search Centre
X-ray angle (°)
Step III - Conversion into X-ray diffraction pattern
Electron wavelength (nm)
X-ray wavelength (nm)
ED Radius Resolution (°)
ED ring Resolution (°)
Start Angle (°)
Convert
1.Nanograined.jpg
Delta-function Edge
Binarization
5 1/nm
Crystal
Refined spots
Hough Trans
Crystal:
N max
List
Int.
208 (111)
127 (003)
2-theta(°)
d-spacing = .277 nm
NUM
1:39 PM
Indexing result
Mouse detecting diffraction angle of RXD and corresponding ring of EDP
Mouse left click for indexing diffracted peaks according to CIF file if structural factor is known
Input or drag CIF file to calculate planar d-spacing and diffraction angle 2-theta。

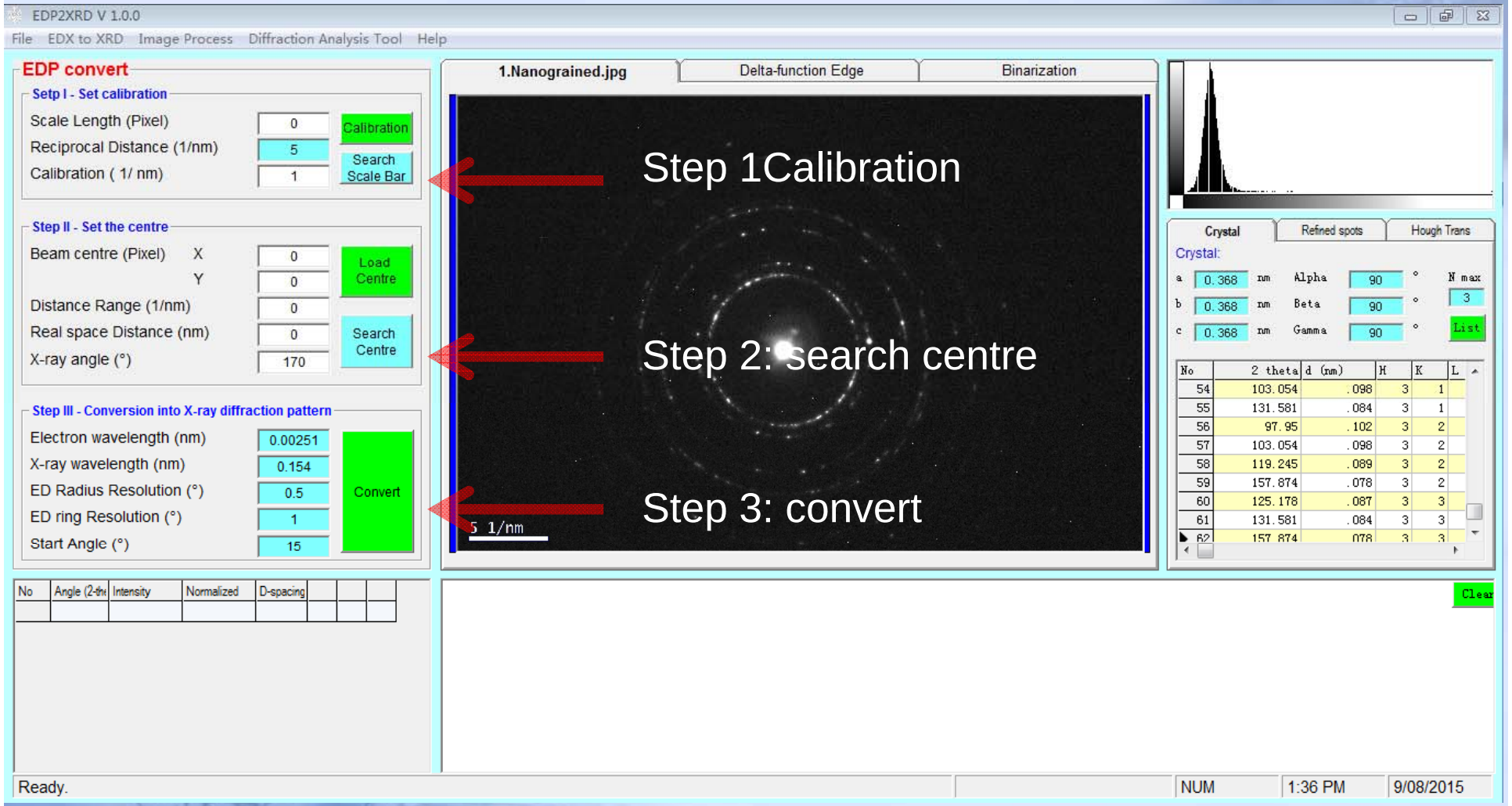
4. Auto Mode 2： Simple conversion

- From Main menu → EDX to XRD → Simple Convert
- Wait until conversion finishes.



Remark： Simple conversion omits all image processing to fast convert EDP which is high quality and low noise. The final conversion pattern is the same as that obtained by one-key conversion with the only difference of conversion time.

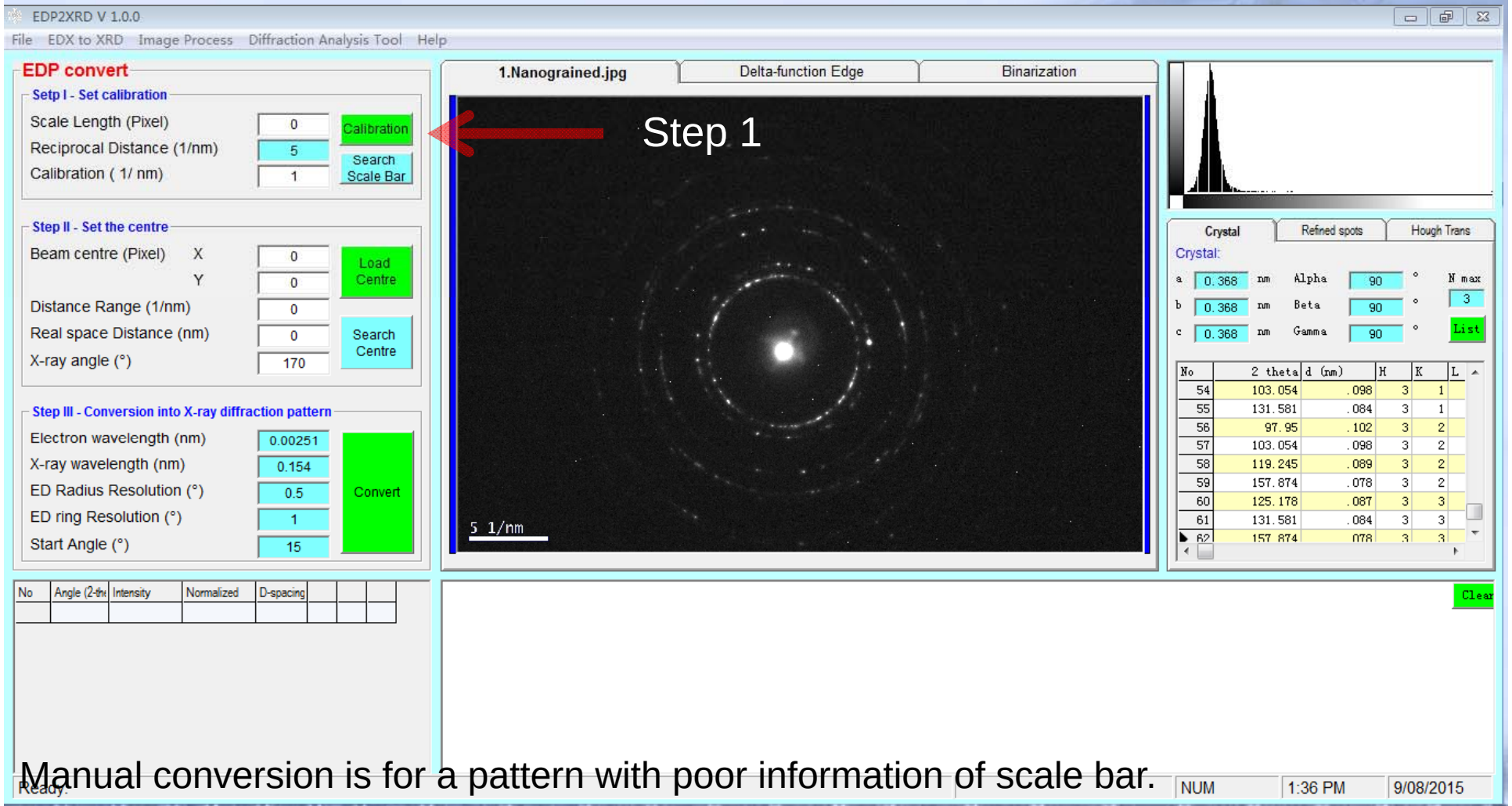
5. Manual Mode1:Simple conversion



Manual mode simple conversion is similar as auto mode simple conversion but with the freedom of controlling each step of conversion.

6. Manual Mode 2: Manual conversion

Step 1: Click “Load centre”, enter scale bar definition mode.

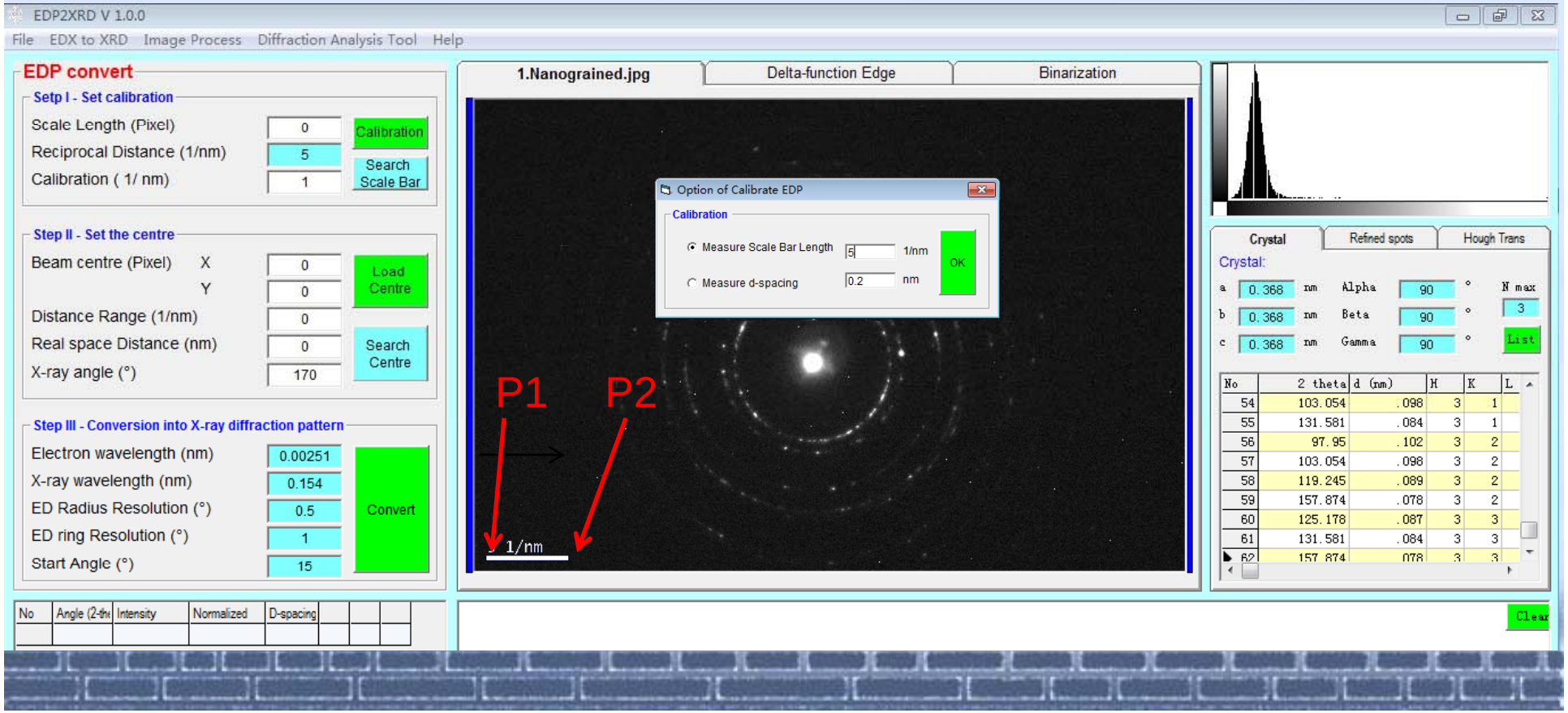


Manual conversion is for a pattern with poor information of scale bar.

6. Manual Mode 2: Manual conversion

Step 2： Define scale bar length

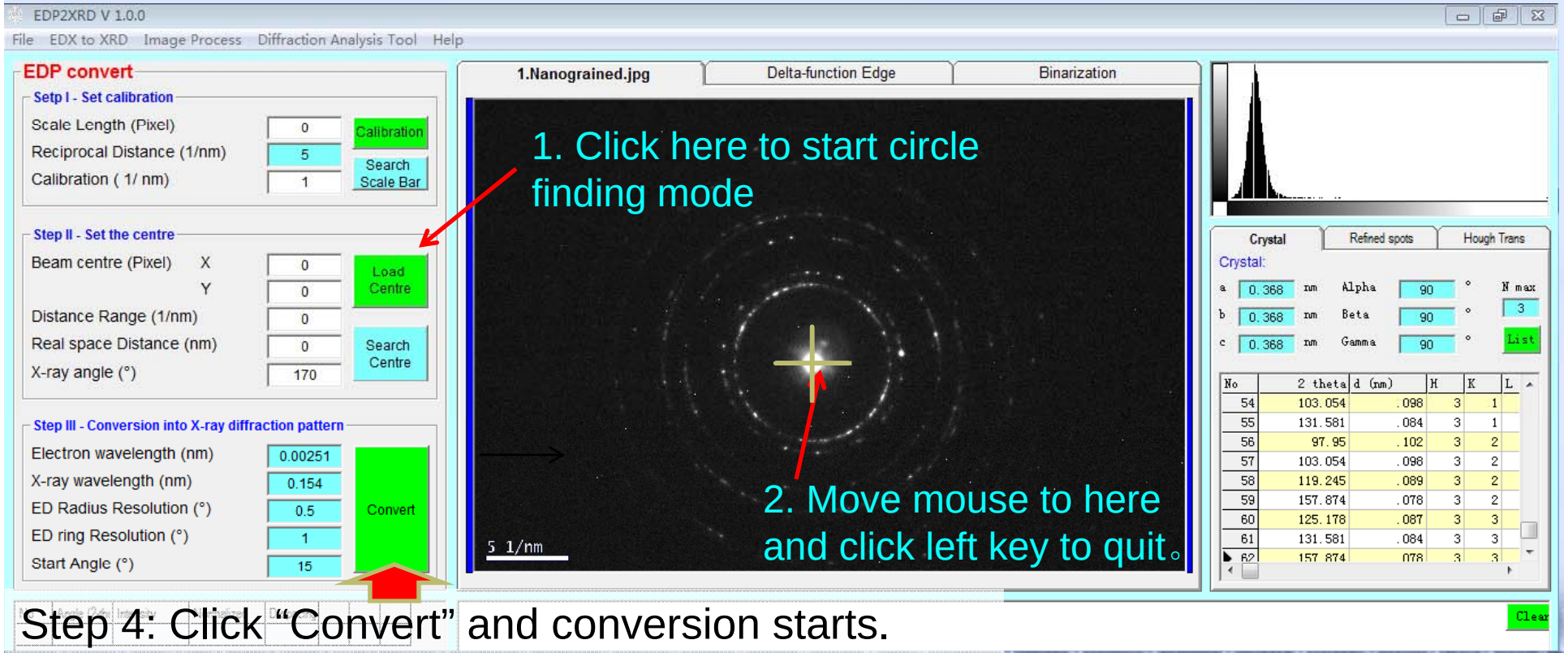
Mouse left key click P1 the start point of scale bar, Keep left key down and move to P2 the end point of scale bar，the release left key. Input the calibration value in the Dialogue box. The length of scale bar will be input into Scale length (Pixel) .



6. Manual Mode 2: Manual conversion

Step 3: Set diffraction ring centre

Mouse left key clicks ”Load Centre” . Move the mouse icon into diffraction pattern area. A red hollow circle will appear using mouse icon as the centre. Carefully move the mouse so that red color circle has the same centre as that of diffracted rings. Then click and release mouse left key. The centre position of diffracted pattern will be input into Beam centre (Pixel) X Y .



Step 4: Click “Convert” and conversion starts.

Image processing

Histogram

Gradation conversion

Contrast inversion

Smoothing

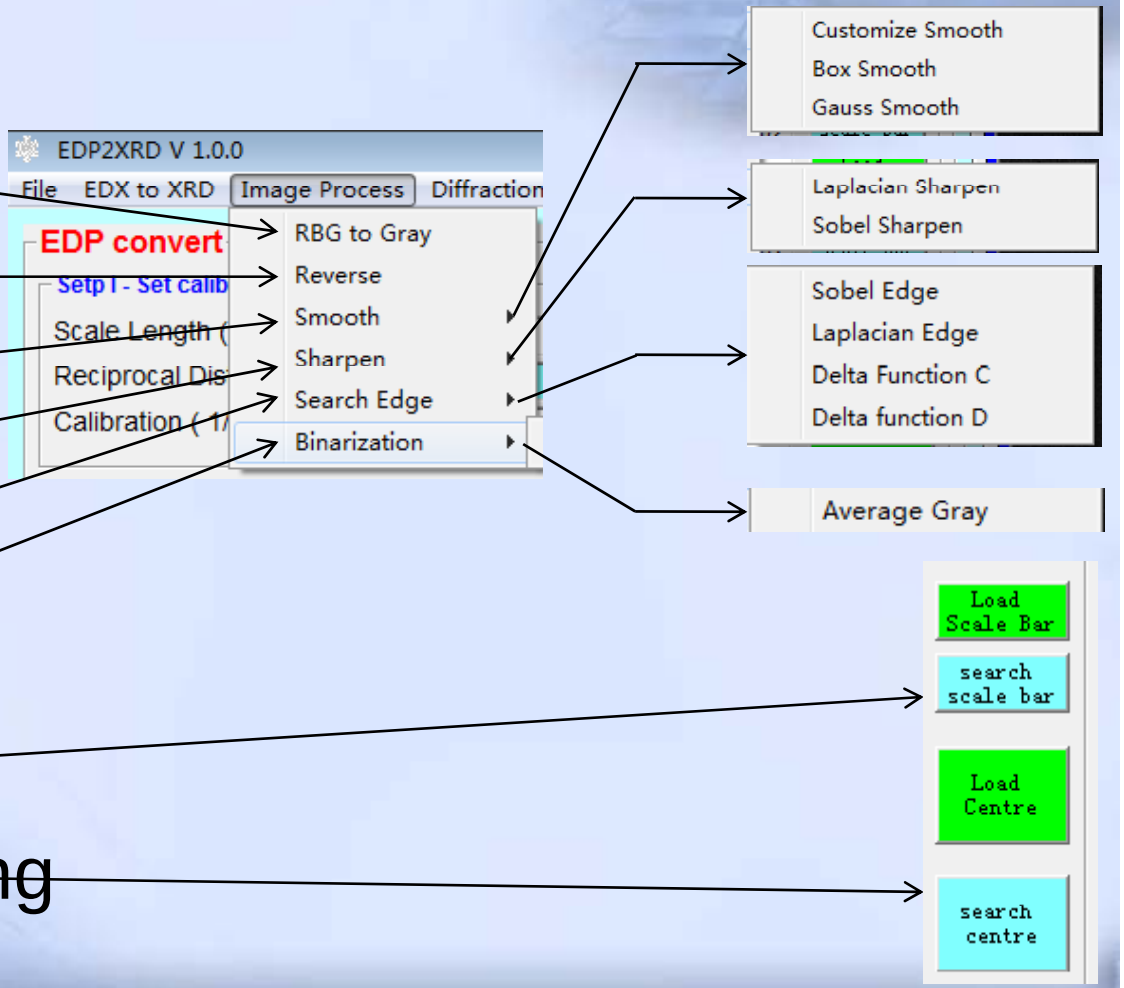
Sharpening

Edge searching

Binarization

Scale bar searching

Circle centre searching



Acknowledgements

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Tank you for choosing EDX2XRD!

Any comment is welcome.