Supplementary information

Three-dimensional rotation electron diffraction: software RED for automated data collection and data processing

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S1. Technical details of software implementation

The RED program package, consisting of the data collection and data processing programs, is written in C++. The graphical user interfaces are implemented using the *Qt framework*. The data collection program has been implemented for JEOL TEMs. It controls the microscope using the external TEM control which is a component object model (COM) module provided by JEOL. Reading data from the camera is implemented using a DigitalMicrograph plugin provided in the *Gatan software development kit*.

3D visualization of reciprocal space in the data processing program is performed using *OpenGL*. The program has optimum performance in visualization with a graphics card supporting hardware OpenGL acceleration. Fast Fourier transform calculations in cross correlation is done using the *AMD Core Math Library*. The data processing program has been tested on Windows and Linux. The data collection program works on Windows only, as it needs to interface with the camera and microscope software that run only on Windows.

▼ Data Collection	▼ Calibration h
Experiment Type Rotation Electron Diffraction Precession Electron Diffraction	Image Shift IS2 to IS1 2.114 +
Data Output Name sample-1 Path D:\	2.114
Acquisition Settings Stage Tilt Step 2.0° 🚖	Diffraction Shift
Beam Tilt Step 0.100° क Beam Tilt Range ±1.100° €	0.763 (x) -0.014 (x) 0.744 (x)
Number of Stage Tilt 5 🖕 Delay between frames(sec) 0.0 👻	IS2 to CLA2
Exposure Time(sec) for EDPs Time 0.5 😴 Add	-1.219 + 1.378 + 1.150 + 1.051 + 1.051 +
Series 0.5	Beam Tilt to CLA2
Grab an Image for Each Goniometer Tilt	-3.5631 + 0.6862 + -0.6759 + -3.6685 +
Start	
Lens Tool	Calibrate
Files Name Stage(°) Beam(°) Overall(°) ^	Calibration Data
103 EXP 8.00 -0.100 7.900	Load Export
104 EXP 8.00 0.000 8.000	
105 EXP 8.00 0.100 8.100	

S2. Graphical user interfaces of the data collection program

Figure S1 Data collection window (a) and calibration window (b) of the RED data collection program.

References

AMD Core Math Library, http://developer.amd.com/tools-and-sdks/cpu-development/amd-core-math-library-acml/

DigitalMicrograph software development kit, http://www.gatan.com/scripting/SDK.php

OpenGL, http://www.opengl.org/

Qt framework, http://qt-project.org/