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TEM based Local Orientation and Strain Mapping plus Reconstruction of the Reciprocal Space Based on 3D Electron Diffraction :

Product Details & Specifications Including both Hardware and Software:

1. Universal device for controlling the TEM beam resulting in theacquisition of Precession Electron Diffraction (PED) patterns.
2. Precession angle can be continuously varied from 0° - 3°.
3. Precession frequency is adjustable from 0.2 to 1KHz, 100 Hz working frequency.
4. Hardware: Precession control unit, interface to TEM (GIS), PC towerprofessionalgrade and software for beam precession withstore/recall values.
5. Transmission electron microscope (TEM) diffraction pattern acquisition software and computer system workstation controls signal over different channels connected to the TEM coils and supplied scan generator. CCD mounted onto the TEM viewing chamber is used for fast data acquisition of precession electron diffraction (PED) patterns while scanning the sample area. Advanced features include: User-friendly graphical interface for PED pattern and pole figures, PED pattern generated for all crystal systems, virtual dark field (VDF) and virtual bright field (VBF) images are displayed together in real time, on-line distortion correction, etc.
6. PED pattern generator makes diffraction patterns for every degree (or less) through the Ewald sphere for every phase/crystal symmetry. Advanced features include: PED patterns are generated for all crystal systems, displays selected reflection intensities and indices.
7. Every calculated-simulated pattern is compared to the experimental diffraction pattern through template matching. Advanced features include: Optimising routines for orientation resolution- automatic camera length calibration, correlation index map calculation and display (for reliability checking), pseudo-bright field or pseudo-dark field image reconstruction mask.
8. Crystal orientations extracted for every pattern related to the scanned area and stored in the results file. Advanced features include: orientation map: pixel colour is related to the sample X, Y or Z crystallographic direction, phase map: pixel colour is related to different existing crystal phases, grain boundaries may be apparent on orientation maps, grain size and pole figure analysis, export facilities compatible with most available image/EBSD-SEM analysis software, grain size distribution analysis, 180 degrees ambiguity correction, etc.
9. Hardware Inclusion: CCD camera and mechanical interface to TEM.
10. Advanced software features include: Virtual STEM/ BF / DF via CCD, Suite of scan modes (spot, line, area, …), Suite of image processing features. Precession Electron Diffraction Pattern Acquisition, Beam Precession Control and automatic alignment, PED patterns from multiple discrete points, lines and areas, Assisted calibrations (camera length, distortion correction), On-line distortion corrected diffraction pattern acquisition, Drift correction, Improved workflow Phase and Orientation Mapping.

11. Novel Automated Strain Mapping solution for TEM/STEM, Nanobeam (NBD) spot patterns “enhanced” with precession, acquire STEM image of region of interest via CCD. Automated scanning synchronized with acquisition of spot precession ED patterns, acquisition from individual positions, line profiles, areas, fast acquisition of diffraction patterns via high frame-rate external CCD camera. Automated Strain Analysis, no need for user to identify spots or principal strain directions, no bias introduced due to the involvement of user judgement in identifying spots. Software to allow for offline data processing/Viewing.

12. Program covering reconstruction of thereciprocal space based on 3D electron diffraction(ED) data and the subsequent determination of cellparameters. Data consist of precession ED patternswhen the holder is tilted (manually) within the tiltlimits of the TEM (usually -40º to +40º at 1ºangular step with single tilt or of specifictomography holder).The reconstructed reciprocal space can bevisualized to determine possible crystal cell parameters (within 2 - 3 % accuracy,automatically). The software also allows the user tospot special crystallographic effects like twinningand disorder. Software module allows the user to indexevery reflection and to extract intensities useablefor structure analysis procedure. Listing of HKL andintensities allow to be used to various freeacademic software for structure solution in order for the user to solve preciselythe atomic 3D crystal structure.

Additional Requirements

i) Qualified microscope engineer visit to pre-qualify the microscope, install new hardware for precession interface and microscope software followed with final microscope calibration and performance testing.

ii) Spatial resolution < 5 nm, Grain size resolved at 00 PED: 3nm and at 0.7PED: 5nm. Strain Sensitivity < 0.1% and Accuracy of in-plain strain: < 0.05%.

iii) **Warranty** should be Two years from the date of installation and commissioning.