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PVA Hamburg
PatentVerwertungsAgentur

Innovative Procedure for Grain Statistics Measurement

Focus Sectors
- Solar Cells
- Thin Films
- X-Ray Diffraction
- Synchrotron
- Material -/ Quality Testing
- Analysis

Project Key Words
- X-Ray
- Diffraction
- Debye-Scherrer Ring
- Grain Statistics

Development Status
Prototype available

Patent Procedure Status
- DE patent filed

Chances for Cooperation
- Licensing
- Patent Sale
- R&D Cooperation

Innovation and Customer Benefit
This innovation is related to a new powder diffraction analysis method. Since Bragg conditions for individual crystallites will change during rotation, diffraction spots on the Debye-Scherrer ring related to individual crystallites will appear and disappear as a reflex crosses the detector plane in the reciprocal space. Computational algorithms allow us to count the signals and determine the number of crystallites which pass the detector plane. The picture becomes even more interesting when only some of the crystallites rotate while the others remain stationary. Records under different stress parameters are pairwise subtracted. The series of difference images allow quantitative analysis of stress induced rotation of crystallites.

Possible customer benefits are:

- Nondestructive and in-situ measurements of rotation of individual crystallites
- Quantitative analysis which can be related to product quality
- Stationary setup without any moving parts
- Distribution of sizes and disorder of rotating crystallites
- Correlation of any combinations of speed, size disorder, initial orientation, preferred rotation direction, onset of rotation of rotating crystallites and identification of statistically relevant factors

Possible Applications
With this technology it is possible to provide quantitative information about the quality of a sample. Grain rotation often influences integral properties of devices e.g. strength, energy conversion efficiency and electronic properties (in isolation or conduction layers) and, therefore, is useful in device production facilities.

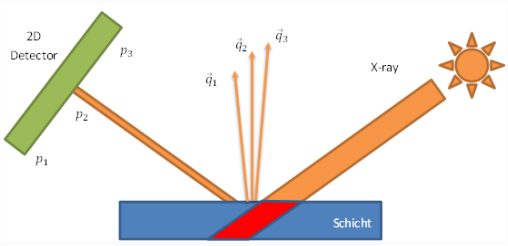

Fig. 1: Real space representation of diffraction (Points p1, p2, p3 on the detector capture orientations of the crystallites with diffraction vectors q1, q2, q3)

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