MAGNETIC QUANTITATIVE TEXTURE ANALYSIS AT THE D19-ILL BEAM LINE USING A 120° CURVED AREA PSD

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Quantitative Texture Analysis (QTA) [1] has been developed for several decades at many neutron centres worldwide. The first analyses used point detectors and needed several days to measure single pole figures. Twenty years ago, the curved position sensitive detector (CPS) of D1B-ILL reduced the acquisition time to nearly one day by providing all the pole figures simultaneously [2]. More recently at the D20-ILL diffractometer, the whole pole figure set got measurable in typically 4h [3].

With the new curved area detector at D19-ILL, QTA even less acquisition times are needed. Such a detector reduces the (χ,φ) usual texture scans nearly by a factor of 5 compared to standard CPS, thanks to an increase in solid angle. This consequently reduces the texture measurements to typically less than 1h. This opens up the possibilities of measuring textures quantitatively in characteristic times comparable to annealing kinetics of ceramics, i.e. to “dynamic” developments of textures like recrystallisation.

Another QTA field under development that requires long acquisition times concerns the characterisation of magnetic momentum orientations in textured polycrystals, called magnetic quantitative texture analysis (MQTA). Characterisation of magnetic materials in terms of angular dispersion of macroscopic magnetic moments is classically accessed using magnetisation measurements. However such measurements are not able to investigate how the resulting magnetic signals are linked to the crystallites and microstructures since they do not probe crystal lattices.

Neutron diffraction is able to probe complex magnetic structures and crystallite texture from nuclear diffraction, then can potentially measure magnetic texture from magnetic diffraction. It is proposed here to further develop an approach which acquiring magnetic diffraction peaks versus sample orientation, to analyse the magnetic orientation distribution functions. Since the magnetic signal is very weak contrary to the nuclear signal, the use of D19 is mandatory. We are showing here the first QTA results on a Belemnite rostrum and MQTA results on a soft Fe-Si magnetic alloy.

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[2] D. Chateigner, H.-R. Wenk & M. Pernet. *J. Applied Crystallography*, **30**, 1997, 43-48.
[3] D. Chateigner, L. Lutterotti & T. Hansen. *ILL report 97 "Highlights"*: 1998, 28-29