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Attenuation correction for position resolved neutron powder diffraction studies

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Phase quantification by means of neutron diffraction relies on the accurate measurement of Bragg peak intensities with respect to diffraction angle. When a neutron beam enters a sample under investigation, the beam is attenuated according to an exponential decay equation which is a function of the total distance that the beam has traversed the sample. As the total path length varies with respect to diffraction angle, gauge volume position and sample dimensions, the acquired diffraction pattern should be treated to account for the attenuation effect. A new module was designed and integrated with the neutron diffraction data reduction system ScanManipulator to perform this correction. Results show that sample shape and relative orientation can have a detrimental effect on untreated data which can lead to incorrect phase quantification. The correction technique can further be used to accurately determine diffraction patterns obtained form position resolved neutron diffraction experiments.

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