

XRD ANISOTROPIC BROADENING OF NANO PARTICLES

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Non-spherical nano-particles have recently become the focus of attention in many applications as they possess specific advanced properties. Anisotropic peak broadening occurs when X-ray diffraction is used to characterise those nano-particles. Typical example is β -Ni(OH)₂ nano-platelets, see the figure. This type of broadening is HKL dependent. In FWHM analysis and Rietveld refinement, additional hkl dependent broadening is

$$\text{used: } B_{hkl} = \frac{M * L_{HKL}}{\cos(\alpha)}$$

B_{hkl} is hkl dependent broadening; L_{HKL} represents characteristic length of the nano-crystal and α is the angle between (hkl) and (HKL) planes. This approach provides a physical background of the broadening and can explain individual FWHM of every peak. Finally analysis has quantified size and shape information of the nano-particles. The method is not only applied in β -Ni(OH)₂ analysis but also be used for TiO₂ nano-rods.

