Self-assembled mesoporous zirconia and sulfated zirconia nanoparticles synthesized by triblock copolymer as template

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Supporting materials

Calculation of particle size from XRD peak broadening

According to the Scherrer equation size of the crystallite, $L_{hkl} = \frac{K\lambda}{\beta_{hkl} Cos\theta_{hkl}}$ Where;

β is the full width of the peak at half maximum intensity of a specific phase (hkl) in radian.

K is a constant that varies with the method of taking the breadth ($0.89 < K < 1$)

λ is the wavelength of incident x-rays.

θ is the centre angle of the peak.

L is the crystallite length.

From Figure 5, $2\theta = 30.260^{o}$ $\theta = 15.130^{o}$ cos (15.130) = 0.96532, β = 0.0202

Here,

$2\theta = 30.260^{o}$, $\theta = 15.130^{o}$, λ = 0.154 nm, K = 0.9

Cos (15.130) = 0.9653, β = 0.0202

L_{hkl} = 7.1 nm