

## Determination of microstructure of nanocrystalline CeO<sub>2</sub> By Williamson-Hall and lognormal distribution methods using Synchrotron radiation

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**Abstract:** Finite crystallite size and strain in polycrystalline material led to broadening of the diffraction lines. By analyzing this broadening, it is possible to extract information on the microstructure of crystalline material. In this research, we obtained the microstructure of nanocrystalline CeO<sub>2</sub> sample using synchrotron diffraction data, applying the whole powder pattern fitting and Williamson-Hall techniques. The volume weighted average crystallite size and the root-mean-square strain both averaged over all reflections found to be 225 Å and  $6 \times 10^{-5}$  respectively. In another attempt a model of lognormal size distribution of spherical crystallite has been used and the average volume weighted crystallite sizes of 234 Å and average area weighted size of 168 Å have been determined, respectively.

**Keywords:** CeO<sub>2</sub>, synchrotron radiation, Williamson-Hall method, lognormal distribution, microstructure.

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