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Nanostructured Cuprous Oxide Powder via High Energy Milling

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The Whole Powder Pattern Modelling technique was employed to investigate the microstructure changes in Cuprous Oxide powders milled in a vibrating cup mill. The effect of milling on the microstructure evolution was investigated using Synchrotron Radiation XRD and standard XRD line profile analysis supported with HRTEM and ESEM techniques. The reduction in the average size of coherently scattering domains - and simultaneous narrowing of the size distribution - occurs in the first minutes. An asymptotic limit of ca. 10 nm is obtained. The reduction in size is obtained at the expenses of introducing a massive quantity of dislocations in the system, reaching a limit of ca. $4 \times 10^{-16} \text{ m}^{-2}$. A proper nanocrystalline microstructure can be obtained with an effective milling time of ca. 20 min.

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