Phase transformation behavior of nanocrystalline chi-alumina powder obtained by thermal decomposition of AIP in inert organic solvent

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Abstract: Thermal decomposition of aluminum isopropoxide (AIP) in inert organic solvents (toluene and mineral oil) resulted in the formation of chi-alumina. Phase evolution by calcination at various temperatures for this alumina was studied via X-ray diffraction. The results suggest a direct transformation from chi-alumina to alpha-alumina at approximately 1180degreesC, without the formation of kappa-alumina phase, while still maintaining the small particle size (< 100 nm). The transformation behavior was observed by TEM and the crytallite size was calculated by the Scherrer equation. The results indicate one χ-alumina crystal transforms into one α-alumina crystal at its critical size in a nucleation step. This crystal exhibits a rapid grain growth following the transformation. (C) 2004 Kluwer Academic Publishers.

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