

Thermal Evolution of the “Mouse Fur” of Fibrous Aluminium Oxide/Hydroxide Formed on Amalgamated Aluminium upon Reaction with Moist Air

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Nano-fibres of amorphous aluminium oxide/hydroxide have been obtained *via* reaction of amalgamated aluminium with moist air. Thermal transformation of the as prepared sample was followed by X-ray powder diffraction and electron microscopy techniques. Crystallisation of γ -Al₂O₃ nanocrystals inside the amorphous fibres starts at 400 °C and the maximum crystal size is achieved at 700–800 °C. The fibrous transition alumina matrix transforms into a sponge-like morphology between 800 and 900 °C. Annealing at higher temperature results in the condensation into large globular α -Al₂O₃ crystals. The entire γ - to α -Al₂O₃ transformation occurs *via* two consecutive steps of coalescence and explosive character, respectively. The direct contact between transition alumina crystals governs the transformation. The presence of some other transition alumina is inferred from high resolution electron microscopy studies, and antiphase boundaries in {111} of the spinel type structure for γ -Al₂O₃ obviously determine the crystallographic path between them.

Key words: Fibrous Amorphous Aluminium Oxide/Hydroxide, Thermal Evolution, Phase Transformation, Electron Microscopy, Powder X-Ray Diffraction