Phase equilibria in the SrO - Sc2O3 - CuO system with emphasis on the Sr14Cu24O41-phase (poster)

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PHASE EQUILIBRIA IN THE SrO – Sc₂O₃ – CuO SYSTEM WITH EMPHASIS ON THE Sr₁₄Cu₂₄O₄₁₋δ PHASE

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The sub-solidus phase relations in the Sc₂O₃ – SrO – CuO system were determined at 900°C in air (see Fig. 1). Like in the case of SRE₂O₃ – SrO – CuO systems with SRE = small rare-earth elements, no ternary compound was formed. However, the Sc₂O₃ – SrO – CuO system is dominated by the Sc₂SrO₄ phase, which is in equilibrium with all other phases. This is not the case in SRE₂O₃ – SrO – CuO systems, where the SRE₂Cu₂O₅ phase is in equilibrium with Sr₁₄Cu₂₄O₄₁₋δ.¹ We confirm that the Sr₁₄Cu₂₄O₄₁₋δ phase is slightly Cu-deficient², its formulation being closer to Sr₁₄Cu₂₃.₅O₄₁₋δ.

While all rare-earth elements substitute on the Sr sites in the Sr₁₄Cu₂₄O₄₁ phase, Sc appears to partially replace Cu instead. This difference can be understood on the basis of ion size considerations. The solubility limit of Sc is low and amounts to about 2 at%. This substitution results in a shrinkage of the c-axis (running along the chains and ladders of the structure) by 0.3%.

Fig. 1. Phase equilibria in the Sc₂O₃ – SrO – CuO system at 900°C in air

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