



Formation of Sub-Micrometer-Sized Cu Particles by Wet Chemical Processing Under Air Using Hydrazine Hydrate

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Abstract:

Cu particles with sub-micrometer dimensions were synthesized under air by a wet chemical process employing ammonium hydroxide as a solvent and hydrazine hydrate as a reductant. Well-dispersed, sub-micrometer-sized Cu particles were stably obtained after heating the mixed solution for time exceeding 60 min at 80 °C with the addition of 0.136 M sodium triphosphate as a dispersant. Scanning electron microscopy images, backscattered electron images, and X-ray diffraction analysis of the particles synthesized using different reaction times demonstrated that the pre-formation of complex salts by the reaction between the copper precursor and ammonium hydroxide, the primary formation of 0.18 μm diameter Cu₂O particles, and reduction of the Cu₂O particles into sub-micrometer-sized Cu particles occurred sequentially. Concurrently, during the reduction, some of the oxide particles were aggregated into coarse assemblies that were slowly transformed into fine Cu particles by budding from their surface.

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