

Phase Evolution and Microstructural Development of Cu₂O: A Spark Plasma Sintering Study

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This study explores the phase evolution and microstructural development of Cu₂O during spark plasma sintering (SPS), followed by post processing annealing. Starting with >99% pure powders, the SPS processing resulted in Cu₂O as the dominant phase, with small traces of metallic copper, resulting from the partial reduction of the Cu₂O powder. After annealing in air atmosphere, both metallic copper and Cu₂O underwent oxidation, generating Cu₂O/CuO composite structures with tunable phase ratios based on sintering parameters. X-ray diffraction shows mixtures of 16-33 wt.% CuO content at sintering temperatures of 800°C and 900°C, and 40-52 wt.% at 850°C, creating CuO-rich composites. Scanning electron micrographs illustrate the presence of well-defined grain structures after sintering. Relative density measurements show a densification above 94% for lower sintering temperatures and times, finally achieving a 100% density for an 850°C sintering temperature at a 2-minute hold time. Our mixed materials may have potential applications in photocatalysis, where tunable control of electronic properties is essential.

Professional Status of the Speaker

Doctoral or Master Student

Interest in submitting a paper in a special issue of

No interest

Invitation letter for visa

No

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