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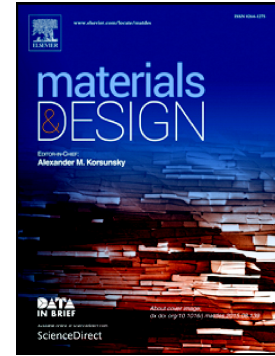
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Microstructure and mechanical strength of near- and sub-micrometre grain size copper prepared by spark plasma sintering

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Keywords: spark plasma sintering; copper; ultra-fine grain size; mechanical properties.

Abstract

Spark plasma sintering (SPS) has been used to prepare fully dense samples of copper in a fully recrystallized condition with grain sizes in the near- and sub-micrometre regime. Two synthesis routes have been investigated to achieve grain size control: (i) SPS at different temperatures from 800 to 1000 °C, and (ii) SPS at 800 °C followed by annealing at temperatures from 950 to 1050 °C. By use of an initial spherical powder with an average particle diameter of $\approx 0.5 \mu\text{m}$, samples with average grain sizes in the range from 0.5 to 3 μm have been prepared. Microstructural examination based on both transmission electron microscope, and on electron back-scatter diffraction studies, confirms the samples are in a

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