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Grain size reduction in Cu powders subjected to ball milling and ball drop experiments

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Abstract

This study examines the rate of grain size reduction as a function of the volume of Cu powder subjected to ball milling and ball drop experiments at constant impact energy. For volumes between 1.6×10^{-3} and 3 cm^3 , the grain size decreases exponentially from about 300 to 19 nm and the rate constant is inversely proportional to the volume of powder. This suggests that the volume of powder undergoing grain size reduction in a given impact is approximately the same, about $7.4 \times 10^{-7} \text{ cm}^3$, for ball milling and ball drop experiments and it is independent of the total volume of the powder.

Keywords: Powder processing; Metals and alloys; Nanocrystalline metal; Microstructure; Microstructural refinement.

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