

The Stability of Oxygen-Free Copper Processed by High-Pressure Torsion after Room Temperature Storage for 12 Months

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Abstract.

Ultrafine-grained copper samples produced by high-pressure torsion were stored at room temperature for 12 months to investigate microstructural stability and the self-annealing phenomena. The results show that samples processed by low numbers of turns exhibit less thermal stability after storage for 12 months by comparison with samples processed by high numbers of turns. A significant decrease in the hardness was recorded near the edges of the discs processed by 1/4, 1/2 and 1 turn due to recrystallization and grain growth whereas a minor drop in hardness values was observed in the samples processed by 3, 5 and 10 turns. This drop in hardness was related to a recovery mechanism.

Keywords: High-pressure torsion, Recrystallization, Self-annealing, Softening, Ultrafine grains