

Hf particles reinforced Cu-Zr-Al amorphous powder produced by milling

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Abstract. This research work dealt with the production of amorphous powder with a nominal composition of $(\text{Cu}_{55}\text{Zr}_{35}\text{Al}_{10})_{97}\text{Hf}_3$ (at%). Combining the mechanical milling and alloying, powder of crystalline Cu-Zr-Al alloy mixed with Hf elemental powder were milled in order to produce a homogenous and amorphous alloy powder. The master alloy and the powders milled for different time were analyzed by X-Ray Analysis (XRD) and Scanning Electron Microscopy (SEM). Particle size distribution and hardness were controlled during milling and at the end of the procedure. The milling caused hafnium dissolution. The 25 h milling time was the optimal to obtain the Hf containing powder with amorphous structure. However, elemental Hf traces with a size below 3 μm were still observed in the powder. After 50 h of milling, such elemental impurities as iron, nickel, chromium originating from milling tools (vial, balls) were detected.