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MECHANICAL AND MICROSTRUCTURAL PROPERTIES OF Cu-Al-Ni-Mn-Zr SHAPE MEMORY ALLOY PROCESSED BY SPRAY FORMING

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Cu-based shape memory alloys (SMA) presents higher thermal and electrical conductivities, low material cost and combine good mechanical properties with a pronounced shape memory effect [1]. By using rapid solidification methods, their microstructure is refined and detrimental segregations can be avoided, which results in better mechanical properties. Additionally, the microalloying additions as Ti, B, Si and Zr can refine the grains and improve of mechanical and thermal properties of Cu-based SMA alloys [2-4]. In this investigation the Cu_{81.95}Al_{11.35}Ni_{3.2}Mn₃Zr_{0.5} (wt%) SMA alloy has been processed by spray forming in order to investigate the potential of achieving a deposit with adequate microstructure with goal to a SMA part production. The alloy was atomized with nitrogen gas at pressure of 0.5MPa. The microstructure of the deposit was characterized by optical and scanning electron microscopy and X-ray diffraction. The deposit presented homogeneous microstructure consisting of equiaxial grains with martensite microstructure and mean grain size of 30 μm. The shape memory effect and the temperatures transformation have been evaluated by differential scanning calorimetric. The mechanical properties were evaluated by tensile and compression tests at room and at 220 °C(T>Af) temperatures. [1] T. Waitz, et al., T, J. of the Mechanics and Physics of Solids, 55, 2007. [2] D. W. Roh, et al., Metall Trans. A, 21, 1990. [3] D. W. Roh, et al., Mat. Sci. and Eng. A136, 1991.