

Structural Characterization of Cu₁₀Mo Alloy Synthesized by Mechanical Alloying

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Copper and its alloys have good electrical and thermal conductivity as well as good resistance to corrosion [1] but it has a low mechanical strength. However, its mechanical strength can be improved by adding alloying elements by means of Mechanical Alloying (MA) and powder metallurgy [2-5].

In this work we report the results of the Cu₁₀Mo alloy, synthesized during 10 h by MA. The microstructural characterization was carried out by X-Ray Diffraction to identify the phases formed after MA process, the crystals size was determined by Rietveld method using the MAUD software [6]. This results were obtained with a value of χ^2 : 1.33 and $R_{wp} = 8.28$ respectively. Finally, analysis of Scanning electron microscopy (SEM) and Energy dispersive spectroscopy (EDS) were used to determine the morphology and chemical composition of the particles formed.

Figure 1 shows the X-Ray results of the alloy. It is possible to observe the presence of different peaks, which correspond to the Cu and Mo elements. By other hand the Rietveld analysis showed a crystal size of 13 and 24 nm and a microdeformation of 38.5×10^{-4} and 3.6×10^{-6} R.M.S., for the Co and Mo respectively.

Figure 2a shows the morphology of the particles analyzed by SEM. It can be observed a different morphology of the particles, the average size is ranking between 5-30 nm. The chemical composition of the particles can be observed in figure 2b where Cu and Mo peaks are observed. It is possible to observe that there is not a presence of other peak, which can indicate contamination from the steel balls used during the milling, the quantification of the elements indicated that the particles are composed of 94.56% wt and 5.46% wt of Cu and Mo respectively.

References:

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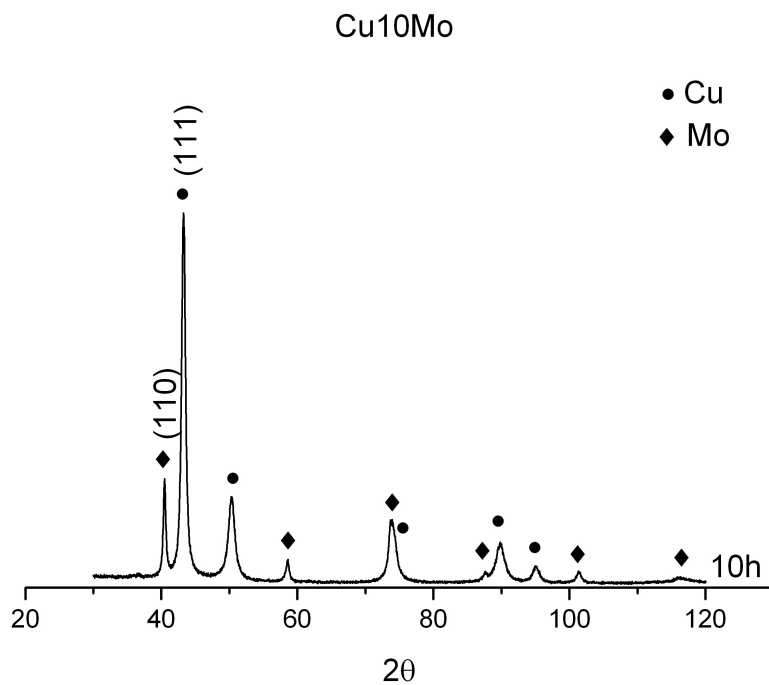


Figure 1. XRD analysis of Cu10Mo alloy milled for 10 h

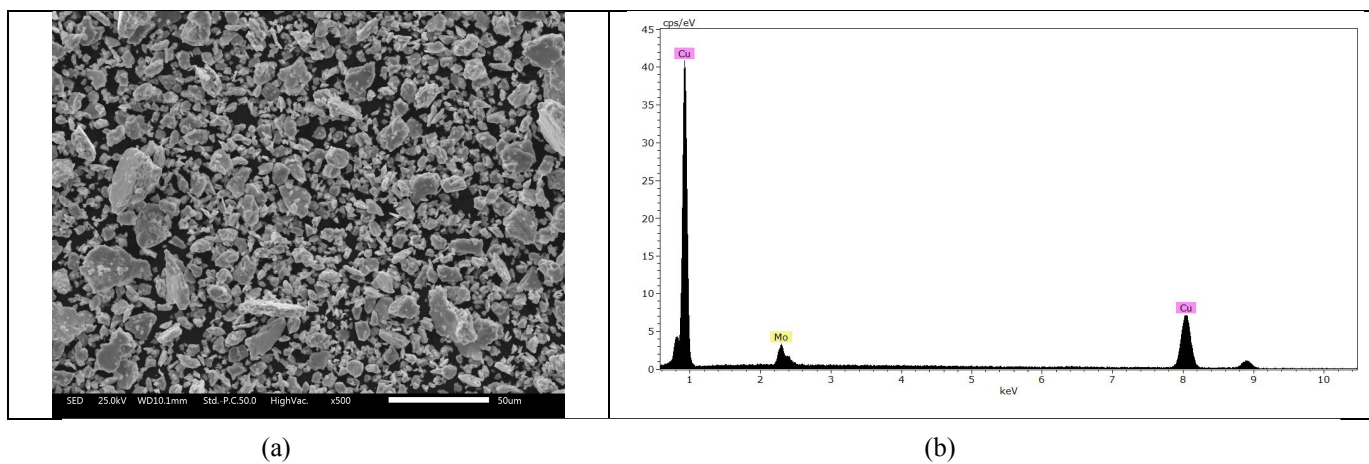


Figure 2. Cu10Mo alloy milled for 10 h a) SEM image and b) EDS analysis