# EFFECTS OF SYNTHESIS CONDITIONS ON THE CHEMICAL HOMOGENEITY OF Cu-Ni ALLOYS OBTAINED BY A NEW PROCEDURE BASED ON THE CITRATE-GEL METHOD

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## ABSTRACT

The effects of synthesis conditions on the chemical homogeneity of Cu-Ni nanostructured alloys were studied by means of electron probe microanalysis (EPMA), X-ray diffraction (XRD), X-ray images (XRI) and scanning electron microscopy (SEM) techniques.
Cu-Ni alloy samples were synthesized through a new chemical route, which consists on the precursor preparation via citrate-gel method, and the subsequent stages of decomposition, calcination and reduction [1]. Different powder samples were obtained by varying the temperature, time and atmosphere in the calcination stage. Chemical and structural characterization of the final products of the synthesis process, as well as of samples obtained at intermediate stages, was performed in order to study the influence of the calcination conditions.
Local composition of the samples was determined by means of EPMA technique, using two X-ray detection systems: energy- and wavelength-dispersive spectrometers (EDS and WDS). Semi-quantitative results were obtained through a standardless EDS analysis with micrometric spatial resolution by detecting K-shell emission lines. Precise values of the Cu-Ni alloy composition were determined through WDS quantifications with resolution at sub-micrometric level by analyzing K- and L-shell atomic transitions [2].
XRD technique was used for the identification of crystalline phases present in the samples. Average grain size of the Cu-Ni solid solutions obtained at the end of the synthesis process was calculated by Scherrer equation. Spatial distribution of Cu and Ni in the alloys was studied by means of XRI, by detecting Cu-Kα and Ni-Kα lines with the EDS. Morphological and topographical features of the samples were analyzed by SEM images.
In general terms, a good chemical homogeneity was achieved in all the alloy samples synthesized. Particular characteristics of the different synthesis conditions are discussed.

***Keywords: Cu-Ni alloys; EPMA; XRD; XRI; SEM***

References:

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