COMBINATORIAL ANALYSIS USING THERMODYNAMIC AND CRYSTALLOGRAPHIC PARAMETERS ON CU-AL-NI-BASED SHAPE MEMORY ALLOYS

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Shape memory alloys have the ability to recover their original shape due to their thermoelastic martensitic phase transformation when subjected to temperature or mechanical field. This feature attracts attention by the possibility of its application on several fields, such as sensors, automotive, aeronautic or biomedical instruments. The martensitic transformation temperatures define the range of temperature of their functionality regarding the shape memory properties (shape memory effect and pseudoelasticity). Thus, the knowledge of the temperatures plays an important role on their work behaviour at a specific condition of temperature and stress. It is well known in the literature that the transformation temperatures are very sensitive with the alloy composition and other features that affect the transformation energies, such as structural ordering, precipitation, grain size and defects. The aim of this work is to understand the influence of composition and some of the others mentioned factors by using the correlation between the electron valence concentration of the alloy, crystallographic compatibility between phases and the transformation energies. Although the results are still scatter due to many parameters involved in the phase transformation, a good correlation between the parameters were found and can be used as a initial tool to tailor the transformation temperatures on Cu-Al-Ni-based shape memory alloys.