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Properties of $(TiZrNbCu)_{1-x}Ni_x$ Metallic Glasses

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Abstract

Recent studies (J. Alloys Compd. 695 (2017) 2661) of the electronic structure and properties of $(TiZrNbCu)_{1-x}Ni_x$ ($x \leq 0.25$) amorphous high entropy alloys (a-HEA) have been extended to $x = 0.5$ in order to compare behaviours of a-HEA and conventional Ni-base metallic glasses (MG). The amorphous state of all samples was verified by thermal analysis and X-ray diffraction (XRD). XRD indicated a probable change in local atomic arrangements, i.e. short-range-order (SRO) for $x \geq 0.35$. Simultaneously, thermal parameters, such as the first crystallization temperature T_x and the liquidus temperature showed a tendency to saturate for $x \geq 0.35$. The same tendency also appeared in the magnetic susceptibility χ_{exp} and the linear term in the low temperature specific heat γ. The Debye temperatures and Young´s moduli also tend to saturate for $x \geq 0.35$. These unusual changes in SRO and all properties within the amorphous phase seem correlated with the change of valence electron number (*VEC*) on increasing *x*.

1. Introduction