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PII: S0040-6031(18)30041-8
DOI: https://doi.org/10.1016/j.tca.2018.02.006
Reference: TCA 77940

To appear in: *Thermochimica Acta*

Received date: 11-10-2017
Revised date: 14-2-2018
Accepted date: 14-2-2018

Please cite this article as: O.Lozada-Flores, I.A.Figueroa, G.González, A.E.Salas-Reyes, Influence of minor additions of Si on the crystallization kinetics of Cu55Hf45 metallic glasses, Thermochimica Acta https://doi.org/10.1016/j.tca.2018.02.006

Influence of minor additions of Si on the crystallization kinetics of $Cu_{55}Hf_{45}$ metallic glasses

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Highlights

- Crystallization kinetics are studied by means of isothermal and non-isothermal heating.
- The small additions of Si shifted the glass transition and crystallization events to higher temperatures.
- The activation energy reached its maximum values at 0.5 at. % of Si and then tended to decrease.

ABSTRACT

By means of differential scanning calorimetry the effects of minor additions of silicon on the crystallization kinetics of $Cu_{55-x}Hf_{45}Si_x$ (x = 0, 0.5, 1.0 and 2.0 at. %) alloys were studied. In the non-isothermal crystallization mode, the Kissinger method was used to obtaining the apparent activation energies of glass transition and crystallization. The highest E_g, E_x and E_p experimental values were found at 0.5 at. % of silicon i.e. E_g = 897.20 kJ/mol, E_x = 516.41 kJ/mol and E_p = 490.22 kJ/mol. In the isothermal mode, the Johnson-Mehl-Avrami model was employed in order to determine the crystallization kinetics, whilst