



AALBORG UNIVERSITY
DENMARK

Aalborg Universitet

Abnormal three-steplike sub-T_g enthalpy relaxation pattern in hyperquenched metallic glasses

An Invited Talk

Hu, Lina; Yue, Yuanzheng

Publication date:
2013

Document Version
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Hu, L., & Yue, Y. (2013). *Abnormal three-steplike sub-T_g enthalpy relaxation pattern in hyperquenched metallic glasses: An Invited Talk*. Abstract from 7th International Discussion Meeting on Relaxations in Complex Systems, Barcelona, Spain. <https://idmracs7.upc.edu/index.html>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

Take down policy

If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.

Abnormal three-steplike sub- T_g enthalpy relaxation pattern in hyperquenched metallic glasses**Hu, Lina²**; Yue, Yuanzheng¹

(1) Section of Chemistry, Aalborg University; (2) Key laboratory of Liquid Structure and Heredity of Materials (Ministry of Education), Shandong University

Our recent work observed a quite different relaxation pattern, i.e., the abnormal three-steplike sub- T_g relaxation in CuZrAl GRs[1]. However, the generality and the origin of this remarkable thermodynamic anomaly remain enigmatic. By hyperquenching strategy, the present work investigated the dependence of thermal history on the sub- T_g enthalpy relaxation pattern (ERP) of $\text{Cu}_{46}\text{Zr}_{46}\text{Al}_8$ glasses, as well as $\text{La}_{55}\text{Al}_{25}\text{Ni}_{20}$ for comparisons. It has been found that the presence of the three-steplike sub- T_g ERP of $\text{Cu}_{46}\text{Zr}_{46}\text{Al}_8$ closely relates to the fictive temperature T_f , whereas no such anomaly is observed in $\text{La}_{55}\text{Al}_{25}\text{Ni}_{20}$ GRs. However, the correlation between T_f and the activation energy for initiating the energy releasing during thermal scanning is three-steplike for $\text{La}_{55}\text{Al}_{25}\text{Ni}_{20}$, revealing the similar phenomenon with the abnormal ERP of $\text{Cu}_{46}\text{Zr}_{46}\text{Al}_8$. These unexpected phenomena have been well explained by the models based on the competitions between the low-temperature and high-temperature clusters used in the terms of the fragile-to-strong (F-S) transition. By analysis on the different chemical feature between $\text{Cu}_{46}\text{Zr}_{46}\text{Al}_8$ and $\text{La}_{55}\text{Al}_{25}\text{Ni}_{20}$ alloys, it is believed that such anomaly of thermodynamic evolution exists generally in metallic glass-forming liquids, and corresponds to the different extent of the F-S transition.

[1]. Lina Hu & Yuanzheng Yue, APL **98**(2011) 081904