



**AALBORG UNIVERSITY**  
DENMARK

**Aalborg Universitet**

## **Sub-Tg enthalpy relaxation in both metallic and non-metallic glasses far from equilibrium**

*An invited talk*

Yue, Yuanzheng

*Creative Commons License*  
Unspecified

*Publication date:*  
2017

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

[Link to publication from Aalborg University](#)

*Citation for published version (APA):*

Yue, Y. (2017). *Sub-Tg enthalpy relaxation in both metallic and non-metallic glasses far from equilibrium: An invited talk*. Abstract from EMN Meeting on Metallic Glasses 2017, Berlin, Germany.

### **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](mailto:vbn@aub.aau.dk) providing details, and we will remove access to the work immediately and investigate your claim.

## Sub- $T_g$ enthalpy relaxation in both metallic and non-metallic glasses far from equilibrium

Yuanzheng Yue

<sup>1</sup> State Key Laboratory of Silicate Materials for Architectures, Wuhan University of Technology, Wuhan 430070, China

<sup>2</sup> Department of Chemistry and Bioscience, Aalborg University, DK-9220 Aalborg, Denmark

E-mail: [yy@bio.aau.dk](mailto:yy@bio.aau.dk)

Sub- $T_g$  enthalpy relaxation is a general feature of the glass state far from equilibrium. However, the feature of the sub- $T_g$  enthalpy is highly dependent on the type of glass formers, i.e., on the type of chemical bonding in glass. In this talk, we present and discuss the common features and differences in sub- $T_g$  enthalpy relaxation for metallic glasses, chalcogenide glasses and oxide glasses, all of which are subjected to hyperquenching ( $>10^5$  K/s). We also demonstrate and analyze the differences in enthalpy relaxation between mechanically generated glasses and thermally hyperquenched (HQ) glasses. Differential scanning calorimetry, NMR, synchrotron, X-ray and neutron scattering have been used as the main tools for the study of both enthalpy and structural relaxation. We explore the structural response of a hyperquenched glass to sub- $T_g$  annealing. We show that structural heterogeneity is a crucial factor that influences the enthalpy relaxation behavior of both strong and fragile glass formers.

1. Y. Z. Yue, C. A. Angell, *Nature* **427**, 717 (2004).
2. A. Monaco, A. I. Chumakov, Y. Z. Yue, et al., *Phys. Rev. Lett.* **96**, 205502 (2006).
3. L. N. Hu, Y. Z. Yue, *J. Phys. Chem. C* **113**, 15001 (2009).
4. L. N. Hu, C. Zhou, C. Z. Zhang, Y. Z. Yue, *J. Chem. Phys.* **138**, 174508 (2013)
5. Y. Z. Yue, *Front. Mater.* **2**, 54 (2015).
6. A. Qiao, H. Z. Tao, Y. Z. Yue, *J. Am. Ceram. Soc.* **100**, 968 (2017).