

The Concentration Glass: A New Glassy State?

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- *Structural recovery (physical aging) after chemical activity-jumps (RH or PCO_2) is qualitatively similar but quantitatively very different from that after temperature-jumps.*
 - *Retardation times are much longer for the same volume departure from equilibrium δ . (Figure 1)*
- *We further showed that the “concentration” glass is a different glass from the “temperature” glass. In particular, the concentration glass is not equivalent to a temperature-hyper quench formed glass. (Figure 2)*
- *Results are first direct demonstration of quantitative differences between concentration- and temperature-glasses.*

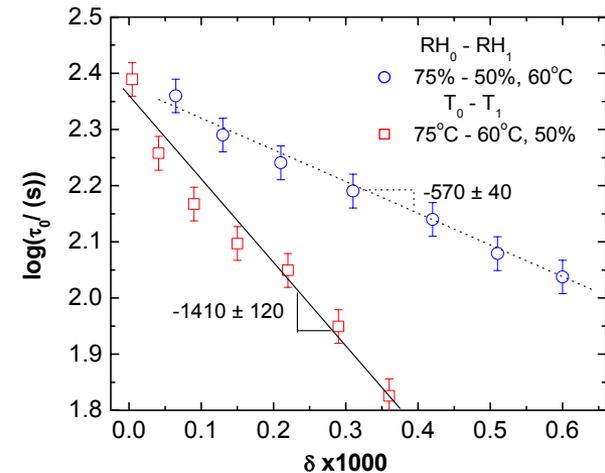


Fig. 1. Plot of creep retardation time vs. δ for temperature-glass (red) and concentration-glass (blue) showing that the concentration glass is more stable (retardation times are longer).

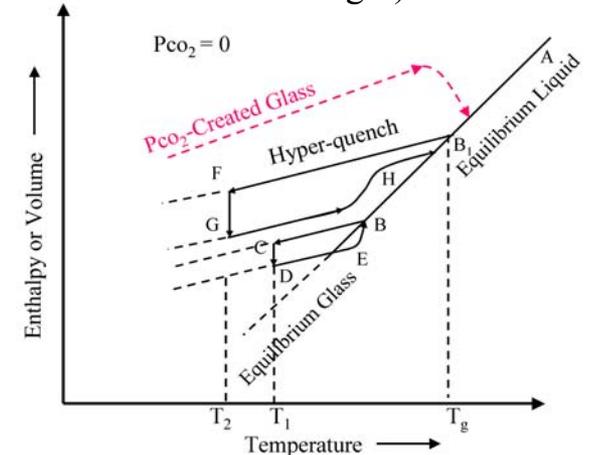


Fig. 2. Schematic of difference between a temperature hyper-quenched glass and a concentration glass in enthalpy or volume vs. temperature space.

Broad Accomplishments-FY2003

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• Education and Outreach

– Project results presented at national and international meetings

- 3M Company, Minneapolis, MN, October 2002 (invited presentation by PI)***
- Society of Rheology in October 2002.(oral presentations by Y.Zheng, graduate student;M. Alcoutlabi, post-doc)***
- AIChE annual meeting, November 2002. (oral presentation by PI)***
- Materials Research Society in December 2002. (invited presentation by PI)***
- APS in March 2003 [oral presentation by Y. Zheng (graduate student); poster presentations by R.D. Priestley (undergraduate student)and and M. Alcoutlabi, (post-doc)]***
- Deformation Yield and Fracture of Polymers, Cambridge, UK (oral presentation by PI)***
- Society of Plastics Engineers ANTEC in May 2003 (oral presentation by PI)***

– Project results presented at one regional meeting

- NaTex in April 2003 (poster presentations by Y. Zheng, M. Alcoutlabi, L. Banda, graduate student and D. Huang, Post-doc)***

• Project results presented at U.S. and International Universities and National Labs by PI

- University College, Dublin, Ireland, April, 2003***
- University of Utah, May, 2003***
- National Institute of Standards and Technology, May, 2003***
- Air Force Research Laboratory, May, 2003***

• Publication

- 2 manuscripts published (Macromolecules, 36, 2387 (2003); J. Chem. Phys., 119, 3590 (2003))***
- 3 proceedings publications***
- 1 manuscripts in review (J. Polym. Sci. Physics Ed.)***