Self-Organization in Network Glasses

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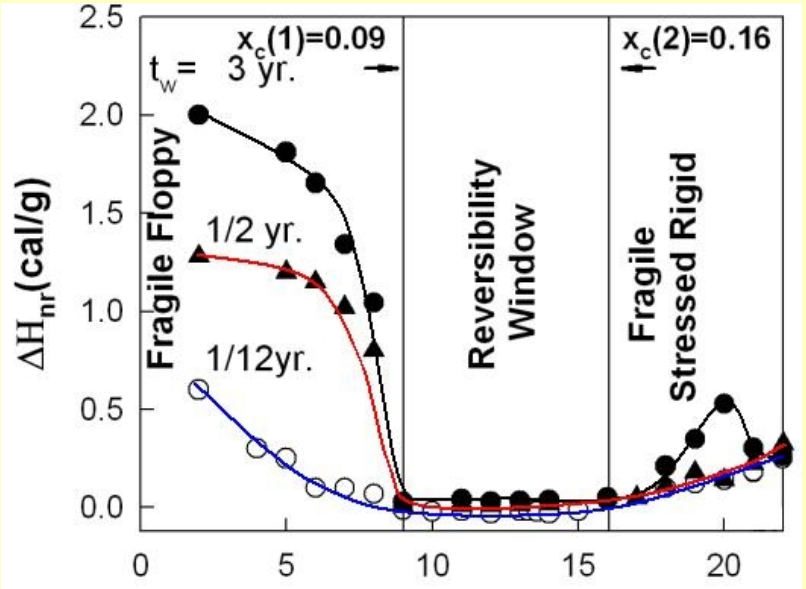

Optical fibers, DVDs and computer memories represent some of the large scale applications of network glasses. *Aging* is generally viewed to be ubiquitous in glasses and a hindrance to applications. Here we find that glasses in select range of chemical compositions not only possess glass transitions that are almost *completely thermally reversing* but also *do not age*. The figure shows a plot of the *non-reversing enthalpy* near T_g, ΔH_{nr} in ternary $As_xGe_xSe_{1-x}$ glasses as a function of x measured 1/12 yr, ½ yr and 3 yrs after synthesis. One finds the enthalpy to *vanish* in the $0.09 < x < 0.16$ range, the *reversibility window*. Note that for glasses in the *window, the enthalpy does age* in sharp contrast to glass compositions outside this *window where the term ages*. Numerical simulations reveal that glasses in the *window* possess backbones that are structurally *stress-free* and these glasses are viewed to be *self-organized*.

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