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The self-organization window in $(Na_2O)_x(B_2O_3)_{1-x}$ glasses VAMSIKRISHNA ROMPICHARLA, T. QU, P. BOOLCHAND, W. HUFF, Univ. of Cincinnati — T-modulated DSC measurements on dry sodium borate glasses show $T_g(x)$ to display a global maximum near x $\sim$ $1/4$, and the non-reversing enthalpy ($\Delta H_{nr}(x)$) to show a square- well like deep and flat global minimum ($\sim$0) in the $0.27 < x < 0.36$ range-the *reversibility window*. In analogy to the work on chalcogenide glasses, we identify borate glasses at $x < 0.27$ to be stressed-rigid, those in the *reversibility window* to be intermediate and those at $x > 0.36$ to be floppy. The *reversibility window* correlates well with a maximum in packing fraction[1] deduced from mass density results and with a maximum in concentration of isostatically rigid diborate structural groupings in NMR[2]. Optical transmission of polished platelets examined with a polarizing microscope show *window compositions* to be optically transparent and clear, while those outside the window at $x < 0.27$ and at $x > 0.36$ to show dark spots of increasing density as one goes away from the window compositions. The spotting reflects birefringence due to stress accumulation. These results confirm that intermediate phases occur in oxide- as in chalcogenide- glasses and form space filling and stress-free or self-organized networks.

1. Steve Feller (private communication).
2. G.E.Gellison and P.J.Bray, JNCS 29, 187(1978).
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