

Abstract Submitted  
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**Vibrational excitations and elastic phases in Sodium Borate Glasses**<sup>1</sup> K. VIGNAROOBAN, P. BOOLCHAND, University of Cincinnati, M. MICOULAUT, University of Paris VI — Glass Transition temperatures ( $T_g$ s) and non-reversing enthalpy ( $\Delta H_{nr}$ ) at  $T_g$  of dry  $(\text{Na}_2\text{O})_x(\text{B}_2\text{O}_3)_{100-x}$  glasses across the  $0\% < x < 44\%$  soda range are measured. Trends in  $\Delta H_{nr}(x)$  show a reversibility window in the  $20\% < x < 40\%$  range, and fix the Intermediate Phase (IP). IR and Raman vibrational modes including Boson modes are also examined. At low  $x$  ( $< 20\%$ ), the Raman active  $808 \text{ cm}^{-1}$  mode of boroxyl rings steadily lowers in scattering strength and red-shifts with increasing  $x$ , suggesting that the stressed-rigid quasi 2D network of  $\text{B}_2\text{O}_3$  glass at  $x = 0$ , steadily softens with a characteristic optical elastic power-law ( $p_1 = 0.85(2)$ ). In the  $26\% < x < 40\%$  range, a mode near  $770 \text{ cm}^{-1}$  rapidly grows in strength and red shifts with increasing  $x$  with a power-law of  $p_2 = 1.05(5)$  characteristic of IPs observed earlier<sup>a</sup> in other 3D covalent and ionic networks. In addition, many other modes are observed, some blue-shift, some red-shift and some remain unchanged with  $x$ . These data will be discussed in relation to glass structure evolution with composition.

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