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Raman scattering and Medium Range Structure of $(BaO)_x(B_2O_3)_{100-x}$-glasses.[1] CHAD HOLBROOK, Air Force Research Labs, RALPH CHBEIR, ANDREW CZAJA, PUNIT BOOLCHAND, University of Cincinnati — In Raman scattering of titled glasses we observe a triad of modes (770 cm^{-1}, 750 cm^{-1}, 705 cm^{-1}) on the low frequency side of the famous Boroxyl-Ring (BR) mode (808 cm^{-1}) as the BaO content x increases in the 0 <x <40% range. Raman polarization experiments reveal that the triad of modes show a rather low depolarization ratio (ρ <0.25) suggesting that each mode results from a symmetric stretch of O atoms in mixed-3-member-rings, analogous to the BR-mode. In the 0 <x <15% range, the conspicuous absence of these mixed-ring modes is consistent with the composition range representing the immiscibility range. At x >15%, the 770 cm-1 mode scattering strength grows precipitously to show a maximum near x_c =20%, consistent with presence of Ba-tetraborate structural grouping (SG). At x >15%, we also observe scattering strength of the 750 cm^{-1} mode to increase with x and show a maximum near x_c = 33%, consistent with formation of Ba-diborate SG. Finally, a mode near 705 cm^{-1}, whose scattering strength increases linearly with x in the 15% <x <40% range, we identify with Ba-metaborate SG. FTIR measurements permit a measurement of the B_4/B_3 fraction and also the LO-TO splittings.

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None

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