Abstract Submitted
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Boson mode, Intermediate Phase, and glass molecular structure of heavy metal Oxides[1] S. CHAKRABORTY, P. BOOLCHAND, U. of Cincinnati — We have synthesized bulk glasses of $(B_2O_3)_5(TeO2)_{95-x}(V_2O_5)_x$ ternary and examined their thermal and optical properties as a function of composition "x." The enthalpy of relaxation at T_g shows a global minimum in the Vanadia concentration of 24% < x < 26.5%, which we identify[2] as the intermediate phase (IP) with compositions at x < 24% to be in stressed-rigid and those at x > 26.5% in the flexible phase. Raman scattering reveals a rich lineshape including a Boson mode, whose scattering strength steadily decreases with increasing x, possibly due to bifurcation of weak (Te-O_{axial}) and strong (Te-$O_{equatorial}$) springs characteristic of TeO_2 building blocks.[3] Vanadia alloying brings in isostatic building blocks, pyramidal $V(O_{1/2})_3$ and quasi-tetrahedral O= $V(O_{1/2})_3$as suggested by present Raman scattering and recent ^{51}V NMR data.[4] We describe the structure evolution of these glasses in terms of the Te-centered and V-centered local structures.

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[2]P. Boolchand et al. Phil. Mag. **85**, 3823 (2005)
[3]S. Sakida, J. Phys.: Condens. Matter **12** (2000)
[4]Ibid.

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