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Phonon dynamics near high temperature phase transition in $\text{Na}_{1/2}\text{Bi}_{1/2}\text{TiO}_3$ LING CAI, JEAN TOULOUSE, Lehigh University, WEI TIAN, Oak Ridge National Laboratory — In this report, we present recent inelastic neutron scattering results on the disordered perovskite system $\text{Na}_{1/2}\text{Bi}_{1/2}\text{TiO}_3$ (NBT). NBT exhibits the relaxor ferroelectric behavior (strong frequency dispersion of the dielectric constant) between 850K and 600K. X-ray and neutron diffraction has shown that the structural transition occurs at $T_c \approx 820\text{K}$ corresponds to the in-plane tilting of oxygen octahedral associated with the softening of a zone boundary acoustic mode. Inelastic neutron scattering was measured in the (002) and (220) Brillouin zones, both above and below the high temperature transition. Transverse acoustic and transverse optic phonon modes were mapped out in these two Brillouin zones. The key observations of the study are: 1) the zone boundary soft mode behavior of both TA and TO modes in (002) zone, 2) the critical TA-TO coupling anomaly around $q=0.15$ (r.l.u.). The latter phenomenon has been well studied in other perovskite systems such as KTaO_3 where a pronounced kink is observed in the dispersion curve of the TA and TO branches at a critical q value. Our results on NBT suggest an anti-crossing type coupling of the TA and TO branches in the dispersion curves.

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