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High-pressure Raman scattering and x-ray diffraction study of relaxor ferroelectric 0.96Pb(Zn1/3Nb2/3)O3-0.04PbTiO3[1] MUHTAR AHART, RONALD E. COHEN, RUSSELL J. HEMLEY, Geophysical Laboratory, Carnegie Institution of Washington, 5251 Broad Branch Rd., NW, Washington DC, 20015 — High-pressure Raman scattering and x-ray diffraction of lead zinc niobate-lead titanate (PZN-4%PT) solid solutions were measured from ambient to 13 GPa. All of the Raman peaks are broad due to the disorder of Zn^{2+} and Nb^{5+}on the B site of the perovskite structure. No obvious soft-phonon-mode feature was observed. High-pressure x-ray diffraction was used to determine the bulk modulus and also revealed diffuse scattering near the Bragg peaks. The diffuse x-ray scattering decreases on compression and disappears at 5 GPa. Changes in both the Raman spectra and the diffuse scattering reflect suppression of the local distortion in the material on compression. The results can be understood in terms continuous changes in the local potential surfaces with increasing pressure. Pressure causes the ferroelectric well-depths to decrease, which causes a continuous transition from ferroelectric to relaxor to paraelectric.

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