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High pressure x-ray diffraction study of single crystal Pb($Sc_{0.5}$ $Nb_{0.5}$)$O_{0.3}$ MADDURY SOMAYAZULU, MUHTAR AHART, RONALD COHEN, Geophysical Laboratory, RUSSELL HEMLEY, Geophyscial Laboratory, GEOPHYSICAL LABORATORY TEAM — We employed high pressure single crystal x-ray diffraction to investigate the pressure-induced phase transition in Pb(Sc0.5Nb0.5)O3 (PSN). At 2 GPa and 300 K, PSN undergoes a phase transition as deduced from earlier dielectric measurements. The pressure dependence of diffuse scattering observed around the (110) Bragg peak indicates that pressure suppresses the local distortion that is coupled to the polar nanoregions. We have monitored the pressure dependence of diffuse scattering at temperatures between 300 - 4 K and used this to understand the P-T phase diagram of PSN. In addition, we also investigated the equation of state at various temperatures. Observed changes in the isothermal compressibility at low temperatures indicate that the first order phase transition changes character at 200 K and 4 GPa. The results can be understood in terms of a pressure-induced decrease in the correlation length among polar nanoregions, which is a unique property of relaxor ferroelectrics.

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