

Abstract Submitted
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The effect of in-situ high-temperature high-pressure on the structural changes of single-crystal relaxor ferroelectrics $\text{PbSc}_{1/2}\text{Ta}_{1/2}\text{O}_3$ (PST) and $\text{PbSc}_{1/2}\text{Nb}_{1/2}\text{O}_3$ (PSN) NAEMI WAESELMANN¹, BORIANA MIHAILOVA, Universität Hamburg, Germany, MARIN GOSPODINOV, Bulgarian Academy of Sciences, Sofia, Bulgaria, ULLRICH BISMAYER, Universität Hamburg, Germany — Relaxor ferroelectrics (relaxor) of the perovskite structure (ABO_3) have remarkably high dielectric permittivity dependent on temperature and frequency as well as remarkable piezoelectric and electro-optic coefficients. These structurally heterogeneous materials undergo a sequence of structural changes on the mesoscopic scale associated with characteristic temperatures resulting from the development of polar order on temperature decrease. Pressure increase on the other hand favors antiferrodistortive order at room temperature. To explore the importance of the antiferrodistortive coupling on the development of polar order simultaneous high-temperature high-pressure Raman studies were undertaken on single crystals of PST and PSN from 400 - 600 K over pressures extending to 9 GPa. We find that the first pressure-induced transition p_{c1} decreases with temperature while the second transition p_{c2} is relatively temperature independent. The behavior of p_{c1} is interpreted as a weakening of the polar coupling, which in turn facilitates the evolution of the preexisting medium-range antiferrodistortive order into a long-range order. The near constant value of p_{c2} suggests that it is independent of the state of polar coupling and is mainly related to the initial correlation length of antiferrodistortive order. Thus the coexistence of both polar order and antiferrodistortive order is required for the occurrence of the relaxor state.

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