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Low-energy lattice dynamics of relaxor-like PFN-38%PT by inelastic neutron scattering

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Piezoelectric crystals of the $\text{Pb}(\text{Fe}_{1/2}\text{Nb}_{1/2})_{1-x}\text{Ti}_x\text{O}_3$ (PFN-xPT) system have drawn much interest in recent years, due to relatively high Curie temperatures and potential multiferroic properties. By substitution of $\text{Fe}^{3+}/\text{Nb}^{5+}$ by Ti^{4+} , the magnetic properties are suppressed: the Néel temperature T_N decreases rapidly with the Ti content and the Curie temperature T_C increases almost linearly. Moreover, at about $x \sim 0.12$, PFN-xPT possesses a morphotropic phase boundary (MPB) between the monoclinic and tetragonal ferroelectric phases. Recently, a polarized Raman study [1] of the PFN-38%PT single crystal reported significant crystalline anisotropy similar to that of tetragonal PbTiO_3 .

In this contribution, we will present our inelastic-neutron-scattering results of lattice dynamics of the PFN-38%PT single crystal in the cubic and tetragonal phases, mainly with respect to the temperature behaviour of the TO soft mode around the phase transition, and the TA-TO coupled-mode analysis in different Brillouin zones and directions. Further the comparison with the end-members of the PFN-xPT series, pure PbTiO_3 [2-5] and $\text{Pb}(\text{Fe}_{1/2}\text{Nb}_{1/2})$ [6], will be discussed.

- [1] I. Rafalovskyi, I. Gregora, H. Luo and J. Hlinka, *Phase Trans.* 87, 1080 (2014).
- [2] G. Shirane, J. D. Axe, J. Harada and J. P. Remeika, *Phys. Rev. B* 2, 155 (1970).
- [3] J. Hlinka, M. Kempa, J. Kulda, P. Bourges, A. Kania and J. Petzelt, *Phys. Rev. B* 73, 140101 (2006).
- [4] M. Kempa, J. Hlinka, J. Kulda, P. Bourges, A. Kania and J. Petzelt, *Phase Trans.* 79, 351 (2006).
- [5] I. Tomeno, Y. Ishii, Y. Tsunoda and K. Oka, *Phys. Rev. B* 73, 064116 (2006).
- [6] C. Stock, S. R. Dunsiger, R. A. Mole, X. Li and H. Luo, *Phys. Rev. B* 88, 094105 (2013).

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