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Effects of electric field on acoustic properties of 0.83Pb($Mg_{1/3}Nb_{2/3}$)-0.17$PbTiO_3$ single crystals studied by Brillouin light scattering[1] TAE HYUN KIM, University of Tsukuba, JAE-HYEON KO, Hallym University, SEIJI KOJIMA, University of Tsukuba — Relaxor-based ferroelectric $Pb[(Mg_{1/3}Nb_{2/3})_{1-x}Ti_x]O_3$ (PMN-xPT) single crystals have attracted great attention because of their exceptionally strong piezoelectric properties. This peculiar characteristic was attributed to the rotation of polarization directions and structural complexity. In this study, the phase transition behaviors of PMN-17PT single crystals have been investigated under an electric field applied along [001] by micro-Brillouin scattering. PMN-17PT single crystals were grown by the modified Bridgeman method. The two (001) surfaces were Au-coated to apply the electric field, and the coating was thin enough to allow the incident beam to transmit without much loss. The electric field of different values was applied to the sample along the [001] direction, and the Brillouin scattering spectrum was measured under both field-heating (FH) and field-cooling (FC) conditions. The electric field of 1kV/cm induced a new longitudinal acoustic (LA) mode component along with a broad Brillouin peak evolving continuously from the paraelectric phase during both FC and FH processes. This was attributed to the remnant polar nanoregions that were not aligned under the electric field due to quenched random fields. However, the splitting of the LA mode did not appear when the electric field was over 2kV/cm indicating a clear structural phase transition.

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