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Light scattering answers precisely to the soft-mode in PbTiO_3 paraelectric phase HWEE PING SOON, HIROKI TANIGUCHI, YASUHIRO FUJII, MITSURU ITOH, Tokyo Institute of Technology (Materials and Structures Laboratory), MAKOTO TACHIBANA, National Institute for Materials Science — PbTiO_3 (PT) acts solely as the long-standing textbook example for the displacive-type phase transition; however, the precise observation of the soft-mode behavior of PT paraelectric phase still remains unavailable although it has been addressed by many research works [1-4]. In this study, we revisit the soft-mode behavior of PT single crystal by the confocal micro-Raman measurements. Opposing to the conventional belief that there occurs no first-order Raman scattering in the centrosymmetric PT paraelectric phase, the temperature dependence of the soft-mode has been precisely resolved for the first time due to the existence of macroscopic size Raman active regions (≥ 780 nm). By evidently ruling out the possibility of defect-induced Raman scattering, the elasto-optical coupling serves as the most likely mechanism for the occurrence of these Raman active regions. [This work was supported by both KAKENHI (Grant No. 20248098) and Global COE program.] [1] G. Shirane, J. D. Axe, and J. Harada, Phys. Rev. B 2, 155 (1970). [2] M. Kempa et al., Phase Trans. 79, 351 (2006). [3] N. E. Tornberg and C. H. Perry, J. Chem. Phys. 53, 2946 (1970). [4] M. D. Fontana, H. Idrissi, and K. Wojcik, Europhys. Lett. 11, 419 (1990).

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