Soft mode spectroscopy in BaTiO3 thin films

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Abstract

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Far infrared (FIR) Fourier transform transmission, time-domain terahertz (THz) transmission and micro-Raman spectroscopy of several BaTiO3 thin films was carried out in a temperature range of 10-520 K. The films were grown on (0001) sapphire substrates using CSD, MOCVD and PLD techniques with thicknesses of 200-1000 nm. The dielectric function was evaluated using various fitting procedures including effective-medium approximation. The behaviour of all soft-mode components was evaluated and compared with that of the single-crystal. In all the films, it indicates a presence of all three ferroelectric phase transitions, even if shifts of transition temperatures, smearing and coexistence of phases were seen. Possible changes of the symmetry compared with that of single crystals are discussed.