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Soft phonons in strained multiferroic TbMmO3 films

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We use far-infrared ellipsometry to determine the anisotropic optical response of the TbMnO3 film in the spectral range of 100-700 cm-1 and temperature range of 10-300 K. The 44 nm thick sample was grown by Pulsed Laser Deposition on an orthorhombic YAlO3 (010) substrate.
We were able to extract phonons properties, and observe softening due to the multiferroic phase transition. The analysis of the TbMnO3 thin film is complicated by the anisotropic response of the YAlO3 substrate, which we have precisely determined a priori on a series of YAlO3 crystals with various surface cuts.