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Title:Ferroelectric phase transition in polycrystalline KTaO₃ thin film revealed by terahertz spectroscopy

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Abstract:KTaO₃ single crystal is an archetypal incipient ferroelectric in which a long-range ferroelectric order does not establish at low temperatures owing to quantum fluctuations. We report on a strong evidence of the ferroelectric phase transition near 60 K revealed by terahertz spectroscopy and microwave permittivity measurements of a polycrystalline KTaO₃ thin film on (0001) sapphire substrate prepared by chemical solution deposition. The soft mode behavior is clearly observed in the terahertz (THz) spectra with a minimum frequency at 60 K. At the same temperature microwave permittivity maximum appears. The THz spectra strongly resemble that of strained epitaxial SrTiO₃/DyScO₃ films: the ferroelectric soft mode is linearly coupled to a central peak which is silent in the paraelectric phase and it becomes coupled to the polarization below the ferroelectric transition temperature with a progressively increasing bare strength.

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