

Poster Presentation

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Structural and optical study of the phase transitions in Lead Hafnate, PbHfO₃

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Lead Hafnate undergoes two structural phase transitions as a function of temperature. The first occurs at about 163°C, consisting of a transition from an antiferroelectric orthorhombic Pbam structure [1] to another antiferroelectric orthorhombic phase with an as-yet undetermined space group. The second is to a paraelectric cubic Pm3m structure at 209°C. Dielectric spectroscopy measurements on a single crystal have shown a distinct temperature hysteresis at the orthorhombic to orthorhombic transition [2]. Recently, dielectric measurements on a ceramic sample have shown a much larger temperature hysteresis and following x-ray diffraction measurements, it is suggested that the second orthorhombic phase is in space group A2mm and undergoes another transition to a tetragonal P4mm structure before the cubic transition [3]. We report on the results of an investigation of a PbHfO₃ crystal using a combination of high-resolution x-ray diffraction and birefringence imaging measurements with the Metripol system. These measurements have been performed as a function of temperature from the room-temperature orthorhombic structure to the high-temperature cubic structure. The results are discussed both in the context of the published work and fundamental understanding of the origin of antiferroelectricity.

[1] D.L. Corker, A. M. Glazer, W. Kaminsky, R.W. Whatmore, J. Dec, and K. Roleder, *Acta Cryst.*, 1998, B54, 18-28, [2] K. Roleder, M. Maglione, M.D. Fontana, I. Jankowska-Sumara, G.E. Kugel, and J. Dec, *Ferroelectrics*, 2000, 238, 139-146, [3] Y. V. Kabirov, M.F. Kupriyanov, E. V. Petrovich, S.I. Duimakaev, and V.O. Ponomarenko, et al, *Phys. Solid State*, 2011, 53, 114-118

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