

Ferroelastic domain switching observed by time-resolved X-ray diffraction

H. Navirian, H. Enquist, R. Nüske, A. Jurgilaitis, C. v. Korff Schmising, P. Sondhauss, and J. Larsson*

Department of Physics, Lund University, P. O. Box 118, SE-221 00, Lund, Sweden

Domain polarization switching in potassium dihydrogen phosphate (KH_2PO_4 , KDP) induced by a propagating strain wave has been observed with time-resolved X-ray diffraction. A pulsed electric field with amplitude of 6 kV/cm and duration of 1 μs was applied along the crystallographic c-axis. The field-induced strain waves emanating from the sample surfaces are the result of the converse piezoelectric effect. In the center of the probed surface two waves interfered constructively inducing ferroelastic domain switching, in the absence of an external electric field, at a delay of 3 μs , corresponding to acoustic propagation at a velocity found to be 1500 m/s.

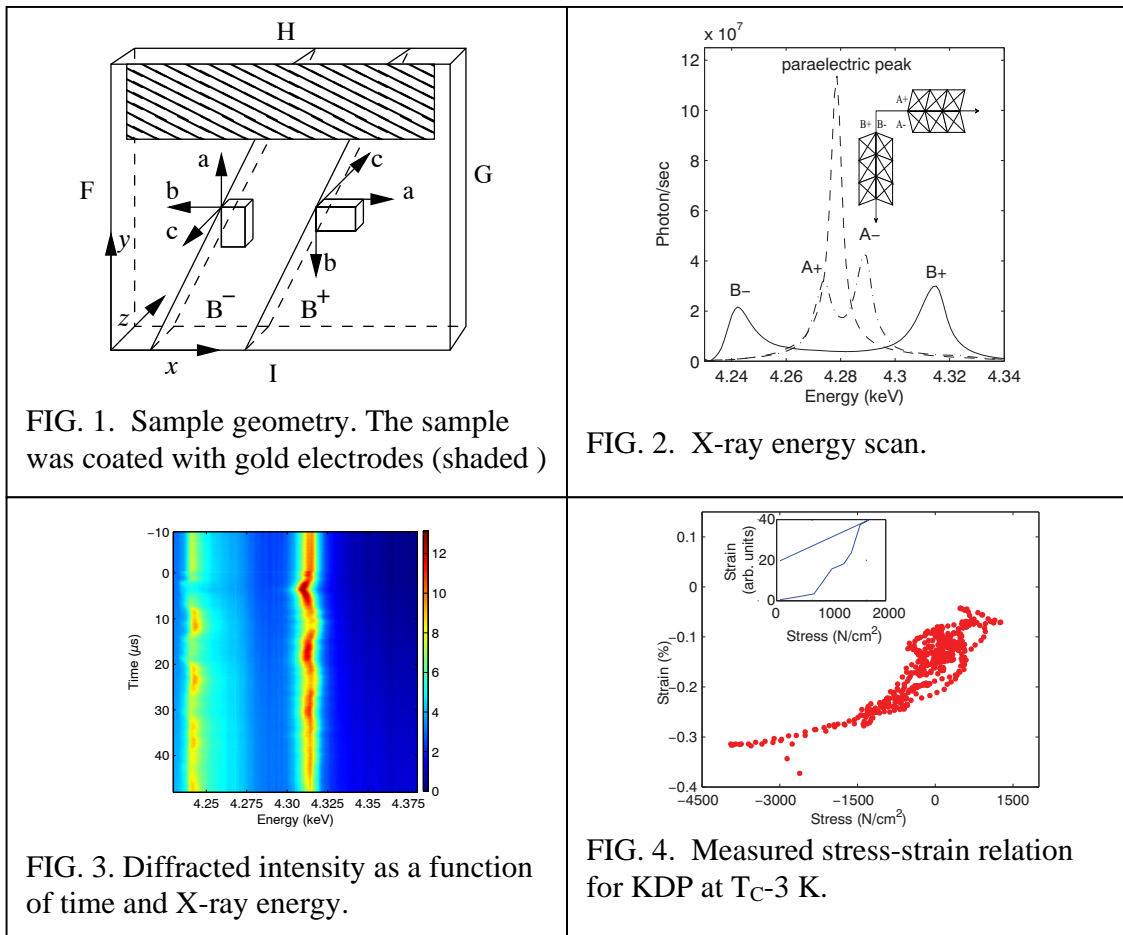


FIG. 1. Sample geometry. The sample was coated with gold electrodes (shaded)

FIG. 2. X-ray energy scan.

FIG. 3. Diffracted intensity as a function of time and X-ray energy.

FIG. 4. Measured stress-strain relation for KDP at T_C-3 K.

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