

[o.m1.p1] Electric field induced distortions in KTP. F. Lorut⁽¹⁾, P. Pernot-Rejmánková⁽¹⁾, M. Schlenker⁽²⁾, J. Baruchel⁽¹⁾ ⁽¹⁾ *European Synchrotron Radiation Facility, BP 220, F-38043 Grenoble, France.* ⁽²⁾ *Laboratoire Louis Néel, CNRS, BP 166, F-38042 Grenoble cedex 9, France.*
Keywords: ferro-electricity, NLO materials.

KTiOPO₄ (commonly known as KTP) is a ferroelectric one-dimensional ionic conductor single crystal. It is widely used as single domain crystals for non-linear optics, especially for Second Harmonic Generation.

Due to its industrial applications, many efforts have been done to obtain large single crystals of good quality [1]. Actually, applied research on KTP is devoted to obtain poled KTP, to perform Quasi Phase Matching. The technique consists of reversing the polarisation periodically along the SHG direction. However, ionic conduction is a limiting factor to obtain poled samples with a very good periodicity.

KTP single crystals have been studied when under an electric field along the polar axis, using X-Ray Diffraction Imaging (or Topography). The 10 years old experiments revealed puzzling effects: The X-ray Bragg diffracted intensity is enhanced by a factor up to ten (in the low absorption case) [2]. X-ray projection topographs of these crystals under field show many lines parallel to the c axis. These images disappear when removing the electric field. Various models have been developed to explain these reversible line defects, but no clear experiment have been done to reinforce/ disclaim one of them.

We suggest that all these phenomena are related to potassium motion:

- It is the limiting factor of poling, by creation of space charges.
- KTP structure indicates that potassium displacements are done via minima local sites [3]. We therefore developed a model based on potassium motion into the KTP structure.

The experiments and the ionic motion related distortions model we developed will be presented in the poster [4]. The topographic technique will also be presented as a new non-destructive technique for studying ionic conductors single crystals distortions.

[o.m1.p2] Structural analysis of nonlinear optical materials. V. Ichharam, J.C.A. Boeyens, *Department of Chemistry, University of Pretoria, Pretoria, 0002, South Africa*

Keywords: nonlinear optics, structure, function.

The crystal structures of the following compounds were examined in this work: 2-(2-thienyl)-1-(2-pyrazinyl)ethene (**1**), 2-(2-thienyl)-1-(2-quinoxaliny)ethene (**2**) and Chromium doped triglycine sulfate (**Cr³⁺:TGS**)

1 and **2** form part of a series of heteroaromatic compounds, which exhibit a nonlinear optical response at the molecular level. Pan, H. et. al.¹ (1995), have reported the synthesis and design philosophy of these materials. A structural analysis of these compounds was conducted to determine whether they would be suitable candidates for nonlinear optical materials in the solid state. It was found that **1** and **2** crystallize in the centrosymmetric space groups Pbc_a and C2/c respectively. A consequence of this is that these materials will not be capable of second order nonlinear effects in the solid state.

Cr³⁺:TGS is a ferroelectric at room temperature. Zhukov et. al.² (1991) reported a change in the x-ray scattering power of Cr³⁺:TGS crystals during irradiation with light from a He-Ne laser (λ=632nm). The mechanism of this response is not known. In an effort to understand this mechanism, a detailed analysis of the crystal structure of Cr³⁺:TGS was conducted. It is proposed that the crystal structure of Cr³⁺:TGS is better described in the space group P1 instead of the generally accepted space group P2₁. This proposition is based on the result that the hydrogen-bonding scheme in Cr³⁺:TGS exhibits P1 rather than P2₁ symmetry.

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