Nonlinear Optical Properties of Lithium Sulfate Monohydrate, $Li_2SO_4\cdot H_2O$

<u>Lkhamsuren Bayarjargal</u>^a, L. Bohatý^a, ^{*a*}*Institute of Crystallography, University of Cologne, Zülpicher Str. 49b,D-50674 Köln, Germany.* Email: bayarjal@uni-koeln.de

Lithium sulfate monohydrate crystallizes in the monoclinic polar space group P2₁ [1]. Among the group of non-ferroelectric polar crystals, Li₂SO₄·H₂O possesses the highest pyroelectric coefficient as well as remarkable piezoelectric and electro-optic properties. However, there is only little known about its nonlinear optical properties [2]. Recently, the possibilities of phase-matched second harmonic generation (SHG) in Li₂SO₄·H₂O were analysed in detail [3]. In this work we present the results of our investigation of the SHG. Using the Maker fringe technique and four differently oriented plane slabs of Li₂SO₄·H₂O crystals all eight independent components of the nonlinear optical susceptibility tensor $[d_{ijk}]$ for the fundamental wavelength $\lambda = 1079.5$ nm (Nd:YAP laser) were determined. In comparison to other polar properties of Li₂SO₄·H₂O the coefficients d_{ijk} are surprisingly small; they are one order of magnitude smaller than those of commonly used crystals for frequency conversion of laser light, such as KTiOPO4, β-BaB2O4, LiB3O5 or BiB3O6. The largest value of a d_{iik} amounts to 0.34(4) pm/V. However, in spite of the relatively small coefficients d_{ijk} there are some interesting aspects for application of Li₂SO₄·H₂O as a SHG material: availability of large high-quality crystals, transparency in the UV region and possibility of phase-matching in the range from near UV to near IR.

[1] Ziegler G.E., Z. Kristallogr., 1934, **89**, 456. [2] Hobden M.V., J. Appl. Phys, 1967, **38**, 4365. [3] Becker P., et. al, Crys. Res. Technol, 2003, **38**, 881. Keywords: nonlinear optics, nonlinear optical materials, optical materials