X-ray topographic investigation of growth defects of L-arginine.HCl crystals

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After the discovered of L-arginine phosphate monohydrate for nonlinear optical application (frequency conversion of Nd:YAG laser) many crystals have been growth based on L-arginine and other amino acids class. L-arginine hydrochloride monohydrate ($C_6H_{14}N_4O_2HCl.H_2O$, L-AHCl) is one of those nonlinear optical materials that have been extensively discussed in terms of its physical properties, for instance, piezoelectric. The crystal of L-AHCl.H_2O belongs to semi-organic crystals group with non-linear optical properties in which the L-arginine molecule is present in the form of a dipolar ion (zwitterion). L-AHCl H_2O crystallizes in a monoclinic structure with space group $P2_1$. In its structure (a = 11.044 Å, b = 8.481 Å, c = 11.214 Å and b = 91.31^o) [1] has two molecules per unit cell and the crystal polar axis is oriented along the crystallographic b-axis. X-ray topography is one of the most used methods to exam the single crystal defects for two beam case (incident and diffracted beams). Chang [2] demonstrated that X-ray multiple diffraction (XRMD) technique is a powerful technique to collect simultaneously more than a one topographic image of crystal. In this work, XRMD have been employed to investigate the internal and surface defects in L-AHCl.H_2O grew by slow evaporation method. Several topographic images were recorded on photographic plate fixed perpendicular to the (500) primary reflected beam and secondary reflected beam at several positions in the peak profile. This characterization helps in the control of crystal growth. Using the phenomenon of the (XRMD) we can get the image of the possible defects of growth of the crystal through the secondary plans. The authors acknowledge the support from National Synchrotron Light Laboratory (LNLS) under proposal D12A - XRD1 4784 and Brazilian Agencies: CNPq.

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