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Noncentrosymmetric halide borate: $K_3B_6O_{10}Cl$

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A perovskite-like phase, $K_3B_6O_{10}Cl$ exhibits a large second harmonic response about four times that of KH_2PO_4 (KDP) and is transparent from the deep UV (180 nm) to middle-IR region. A high quality single crystal of $K_3B_6O_{10}Cl$ with dimensions up to 30 × 15 × 7 mm3 was successfully grown by the top-seeded solution growth method. Crystal morphologies and growth habits of $K_3B_6O_{10}Cl$ grown with seeds oriented along [101] and [211] were studied, and the best growth direction was obtained., The refractive indices of the crystal were measured by the minimum deviation technique and fitted to the Sellmeier equations. The nonlinear optical coefficients have been determined by the method of Maker fringes at λ=1064 nm. The suitable nonlinear optical coefficients as well as comparatively easy crystal growth make the $K_3B_6O_{10}Cl$ crystal a promising candidate for NLO materials.

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Analysis of ordering in AlxGa1-xAs using X-ray diffraction

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In the present study the quantity of the variant III CuAu-I-type ordering of AlxGa1-xAs grown on (110), (111) A and (001) GaAs substrates is determined for different temperatures and Al fractions. For this purpose AlxGa1-xAs films were produced by metal organic chemical vapor deposition and analyzed using X-ray diffraction at the African Synchrotron Radiation Facility in Grenoble. It is found that the ground state of AlxGa1-xAs is given by the CuAu-I-type structure, followed by the metastable disordered phase. The samples with an Al fraction of x=0.5 typically have the highest ordering degree. This agrees well with the fact that the CuAu-I-type is a superstructure of AlAs and GaAs monolayers. Generally, a high degree of order is observed for high growth temperatures and low growth rates. With respect to the substrate orientation the ordering is found to be strongest for samples grown on (110) substrates with a maximum long-range order parameter S of 0.07±0.01, followed by the samples grown on (111) A and (001) substrates with an S of 0.019±0.004 and 0.006±0.003, respectively. Because of symmetrical considerations, a total S of 0.057±0.007 is expected for the (111) A samples. This is close to the ordering degree of the (110) samples, reflecting the (110)-like surface configuration as a result of the vacancy (2x2) surface structure of the (111) A face at higher temperatures.

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