Crystallization of $RAl_3(BO_3)_4$ and $R:YAl_3(BO_3)_4$ Single Crystal Layers

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Current development in miniature optical components leads to extensive study of single crystal layers because of a number additional benefits such as ability to use materials with high doping levels or to obtain high gain with modest pump powers. New crystals of solid solutions based on the YAl₃(BO₃)₄-RAl₃(BO₃)₄ (YAB-RAB) systems are promising solids for self-frequency doubling lasers [1].

In this report, our recent results on liquid-phase epitaxy (LPE) of RAB and R:YAB single crystal layers are discussed. Variations of growth rates of these layers were determined, in order to control crystal growth mechanism. Relations between the growth rate V and relative supersaturation β were found. It is also shown that primarily volume and surface processes occur simultaneously although evidence is presented for kinetic limitation of the growth rate on the later stage.

Besides, growth spirals epilayers frequently exhibit irregularities such as cusps and corrugations, but flat areas may also present on the surface. Micromorphological features as well as growth kinetics greatly depend on the substrate perfection.

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[1] Dorozhkin L.M., Kuratev I.I., Leonyuk N.I., Timchenko T.I., Shestakov A.V., Sov. Tech. Phys. Lett., 1981, 7, 555.

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