

Growth of the KDP filamentary crystals from solution with impurities

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The filamentary crystal formation is one of the qualitative indicators of an impurity preferential adsorption.

The effect of different trivalent metal ions impurity on growth of the KDP filamentary crystals at high concentrations (0.4-1.5 g/l) and supersaturations (50-90%) of a solution has been studied. The first stages of whiskers growth formation have been studied by Atomic Force Microscopy. In aggregate with optical measurements it can help to find out both mechanism of the whiskers formation, and the influence of an impurity. The dependences of growth rate of KDP filamentary crystals on relative supersaturation of a solution and on the impurity concentration for different trivalent metal ions were compared.

Short time submergence of the {101} KDP single crystal substrates in the solution with impurity added and following scanning in air already allowed to trace the dynamics of the growing surface. Being adsorbed on a surface, the impurity interferes with the step motion, that results in non-uniform face growth. The separated bulges at later stage are evidence of this process. The similar relief was constructed by a method of statistical trials for a model Kossel crystal face. Pyramidal asymmetrical growth hills and separated bulges are probably bases of the incipient filamentary crystals.

A model of formation and growth of the KDP filamentary crystals and of the mechanism of the effect of the impurity on the growth process are proposed.

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