Crystal Growth, an important branch of the solid state physics for technology development

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In the past, alkali halide crystals assumed an important position in the field of solid state physics. Many of the concepts and tools of solid state science, as well pratical applications, have been developed as a result of their investigation, and different single crystals growth procedures were improved in view to prepare alkali halides with optimized properties for such studies. Similarly, in the early studies of semiconductors (Ge and Si) which resulted in the transistor discovery in 1947, the development of purification and controlled crystal growth procedures (bulk crystals for substrates or epitaxial layers in integrated circuits), allowed the faster development of the semiconductor electronic, since the presence of impurities even in very small proportions had a large effect on the properties of these materials. Many things as computers, mobile phones and internet would not be possible without high quality materials. In both cases, the growth of single crystals with controled properties allowed not only advances of experimental studies on solid state science, as permited the development of new important devices. Many other examples may be cited showing the correlation between advances on crystal growth and development of technology based on solid state physics; as piezoelectric crystals developed for sensing applications, optical crystals for scintillation detectors (medical and nuclear applications), laser crystals for solid state laser and more recently, nanocrystals (oxides, fluorides and semiconductors), which if prepared with defined/controlled sizes and morphologies, are useful in a wide range of applications. In this work, a short review on crystal growth developments mainly applied to the optimization of optical materials for solid state lasers will be presented. The approach will involves the discussion of bulk, micro- and nano-crystals growth from the perspective of the laser systems evolution.