

Fluoride Crystals: Exotic Materials for Optoelectronic Applications

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We developed high-quality single fluoride crystals by Czochralski technique. This activity covers different applications such as LIDAR, DIAL, high-resolution spectroscopy, metrology, biology and optoelectronic.

Among the crystals we can mention LiYF_4 , LiLuF_4 , BaY_2F_8 and LiGdF_4 doped with rare earth ions (Ho^{3+} , Tm^{3+} , Pr^{3+} and Yb^{3+}). We have also studied the spectroscopic properties, and by using these crystals we have developed high-efficiency solid state lasers in the near infrared (1 μm and 2 μm) and in the visible region, both tunable and fixed wavelength, in cw and pulsed operation regime. Particular attention has been devoted to fluoride crystals doped with Tm^{3+} , and we obtained 70% slope efficiency and 300 nm wavelength tunability. Moreover we studied samples doped with Ho^{3+} in cw and pulsed regime. We have also investigated and compared laser emission in the visible region of three different crystals (YLF, LiLuF and LiGdF) doped with Pr^{3+} for RGB application. Also we studied YLF crystal doped with Yb^{3+} and showed for the first time the development of solid state cryocooler at 125 K temperature.