# Growth of perovskite oxide single crystals and their luminescence and scintillation properties

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Inorganic scintillation single crystals have been utilized in many fields of technology and research, such as high-energy physics, environmental monitoring, geological survey and oil well logging or astronomy. The Medical imaging and especially security scanning are nowadays the applications mostly stimulating the development of new scintillation materials due to increasing demands on their performance.

Aluminum perovskites represent an important group of promising scintillation materials [1], but due to a difficult crystal growth, not much attention has been paid to them so far. The crystal growth of perovskite crystals for gamma-ray detection and by the micro-pulling-down method [2] will be presented and discussed together with brief overview of their structure and luminescence and scintillation characteristics.

The $SrHfO_3$(SHO) - based perovskite scintillators have been studied since 1990's [3]. High efficiency and quite fast decay time were reported for Sr-deficient undoped SHO powders [4]. Similar scintillation properties were found for the Sr-deficient lighter, the strontium zirconate $SrZrO_3$ (SZO). Due to very high melting points (2730 °C for SHO, 2646 °C for SZO), all the research was conducted on powders or ceramics. Therefore, we prepared single crystalline samples of undoped Sr-deficient SHO and SZO using the optical floating zone method to perform a study on their luminescence and scintillation properties. The overall scintillation efficiency of SHO was comparable to the $Bi_4Ge_3O_{12}$ reference scintillating material, while that of SZO was considerably lower. The luminescence mechanism and scintillation properties of the SHO and SZO crystals will be presented and discussed together with the crystal growth and morphology.

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