/opt/indico/archive/2016/C8/40222322483

_logo_small.jpg

Contribution ID : **153**

Type : **Poster**

Recent progress in oxide scintillation crystals development by low-thermal gradient Chozchralski technique for particle experiments

Tuesday, 28 February 2017 17:00 (1:00)

Content

Modern experiments in high energy, astroparticle and astrophysics experiments call for high performance scintillation detectors with unique properties: radiation-resistant in high energy physics and astrophysics, highly radiopure, containing certain elements or enriched isotopes in astroparticle physics applications. The low-thermal gradient Chozchralski (LTG CZ) crystal growth technique provide excellent quality large volume crystal scintillators thanks to absence of thermoelastic stress in the crystal and overheating of the melt. The features are particularly significant in production of crystalline materials with strong thermal anisotropy properties and low mechanical strength. Another advantage of the LTG CZ method is a much lower level of the melt evaporation. It allows to improve the melt stoichiometry and minimize losses of the charge, crucially important in production of crystal scintillators from enriched isotopes. The LTG CZ is especially efficient in large volume scintillators production. Radiation-resistant high optical properties bismuth germanate crystals with mass up to 75 kg were produced for high energy physics and astrophysical experiments. Production of high performance cadmium tungstate crystals with mass 20 kg is well established too. The LTG CZ technique looks an out-of-competition approach to produce crystal scintillators from enriched isotopes for double beta decay experiments. Excellent quality cadmium tungstate crystal scintillators from enriched 106Cd and 116Cd with a yield of crystal boule up to 85% of initial charge, and very low irrecoverable losses less than 1%, were obtained. Similar specifications were also achieved in R&D of zinc and lithium molybdenum crystals from enriched 100Mo for cryogenic double beta experiments. It should be stressed that the LTG CZ method opens a possibility to obtain deeply radiopure crystal scintillators by using double crystallization with reasonable amount of starting material thanks to the very large yield of crystalline boules. An R&D is in progress to produce highly radiopure zinc tungstate crystal scintillators for the ADAMO dark matter project aiming at search for the directionality of Dark Matter candidate particles. R&D of large volume sodium molybdate (Na2Mo2O7), calcium molybdate (CaMoO4), and lead molybdate (PbMoO4) for double beta decay experiments will be reported too.

Summary

Primary author(s) : Dr. SHLEGEL, Vladimir (NIIC)

Co-author(s) : BOROVLEV, Yuri (CML Ltd); Dr. GRIGORIEV, Dmitri (Budker Institute of Nuclear Physics); GRIGORIEVA, Veronika (NIIC); DANEVICH, Fedor (Institute for Nuclear

Research); IVANNOKOVA, Nina (NIIC); Dr. VASILIEV, Yan (NIIC); POSTUPAEVA, Anna (CML Ltd)

Presenter(s) : Dr. SHLEGEL, Vladimir (NIIC); GRIGORIEVA, Veronika (NIIC); IVANNOKOVA, Nina (NIIC)

Session Classification : Posters

Track Classification : Calorimetry