ID příspěvku: **62** Typ: **Prezentácia**

New red/IR emitting scintillators and their characterization by amplitude spectrometry

úterý 20. září 2022 13:20 (15 minut)

In recent years, the development of new semiconductor photodetectors, e.g., avalanche photodiodes (APD), silicon photomultipliers (SiPM), and TFT (thin-film transistor), lead to an increased interest in red and infrared emitting scintillators. These photodetectors allow the construction of more compact and robust scintillation detection units, are compatible with magnetic fields, and exhibit generally higher quantum efficiency than photomultipliers. Moreover, red/IR emitting scintillators of smaller band-gap are theoretically able to outperform more common UV/blue emitting scintillators in terms of light yield and energy resolution.
Czech Technical University has built a new APD-based amplitude spectrometry setup for red/IR emitting scintillator characterization. The performance of the setup was tested using high quality GGAG:Ce,Mg (Gd₃Ga₂Al<s
crystal. Measurements of light yield, energy resolution, proportionality, timing characteristics were carried out. Independently, the light yield of the GGAG:Ce,Mg sample was determined by HPMT-based setup for verification purposes. Also, setup performance dependence on bias voltage was studied.
Two sets of samples with different dopant concentration were characterized by an amplitude spectrometry setup based on APD: Cs₃Cu₂I₅:In and CsEuBr:Sm. Light yield and energy resolution were determined. The best sample Cs₃Cu₂I₅:In(0.2 %) exhibited light yield 43 600 photons/MeV and 5.0 % FWHM under ¹³⁷Cs irradiation. The response of a black scintillator Cs₄EuBr₆:Sm samples is much less promising: light yield 5740 ph/MeV at best and FWHM is above 20 %.
With light yield 43 600 ph/MeV and good optical quality of Cs₃Cu₂I₅:In(0.2 %) single crystal, good performance in intended application, i.e. x-ray imaging, was expected. Indeed, Cs₃Cu₂I<sub>
based imaging system exhibit resolution 16 lp/mm.

Hlavní autoři: PRŮŠA, Petr (FJFI ČVUT v Praze); KOTYKOVÁ, Monika (FJFI ČVUT v Praze); WANG, Qian (Shanghai Institute of Ceramics, Chinese Academy of Sciences); ZHOU, Quan; NIKL, Martin (Fyzikální ústav AV ČR, v.v.i.); XIAO, Jiawen (Institute of Microstructure and Property of Advanced Materials, Beijing Key Lab of Microstructure and Property of Advanced Materials, Faculty of Materials and Manufacturing, Beijing University of Technology); KUČERKOVÁ, Romana (Fyzikální ústav AV ČR, v.v.i.); BIETLEROVÁ, Alena (Fyzikální ústav AV ČR, v.v.i.); BOHÁČEK, Pavel (Fyzikální ústav AV ČR, v.v.i.); BABIN, Vladimir (Fyzikální ústav AV ČR, v.v.i.); LINHART, Vladimír (FJFI ČVUT v Praze); WANG, Jingkang (Shanghai Institute of Ceramics, Chinese Academy of Sciences); WEN, Xuemin (Shanghai Institute of Ceramics, Chinese Academy of Sciences); NIU, Guangda (Wuhan National Laboratory for Optoelectronics and School of Optical and Electronic Information, Huazhong University of Science and Technology); TANG, Jiang (Wuhan National Laboratory for Optoelectronics and School of Optical and Electronic Information, Huazhong University of Science and Technology); REN, Guohao (Shanghai Institute of Ceramics, Chinese Academy of Sciences); WU, Yuntao (Shanghai Institute of Ceramics, Chinese Academy of Sciences)

Přednášející: PRŮŠA, Petr (FJFI ČVUT v Praze)

Zařazení sekce: Metrológia, meranie a prístrojová technika

Tematická klasifikace: Metrológia, meranie a prístrojová technika