In situ growth of Te-doped Cs2SnCl6 scintillator composite films for X-ray imaging

Junnan Wang,

Zeyu Wang,

Nikolai V. Gaponenko[1],

Jindou Shi,

Zheyuan Da,

Chen Zhang,

Yongqiang Ji,

Qing Yao,

Youlong Xu,

Minqiang Wang

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[1]Belarusian State University of Informatics and Radioelectronics, 6 P. Brovki Street, Minsk, 220013, Belarus.

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Abstract: X-ray imaging technology has been integral to numerous aspects of people's lives since its inception. With the growing demand for advanced imaging technologies, lead-free metal halide perovskites have received significant attention due to their non-toxicity, stability, and excellent optical properties. This paper investigates the scintillation behaviour of a Te doped Cs2SnCl6 scintillator composite film (CF) prepared through an innovative in situ growth strategy. This approach

achieves the direct growth of Cs2SnCl6:Te micro-crystals within polymethyl methacrylate (PMMA), mitigating the issues of optical property degradation and inhomogeneous distribution that are inevitable in a conventional two-step mixing method. By controllable optimization of the doping ratio of Te, the Cs2SnCl6:Te/PMMA CFs exhibited exceptional scintillation properties under X-ray irradiation, with the detection limit reaching up to 112 nGyairs−1. In X-ray imaging applications, the Cs2SnCl6:Te 15%/PMMA CF demonstrated advanced sensitivity, producing high-resolution structural images of the target object. This advancement highlights the promising potential of lead-free metal halide perovskites in the development and application of X-ray imaging technology.

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