

Scintillation Properties of TlGd_2Cl_7 (Ce^{3+}) Single Crystal

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Scintillation properties of new TlGd_2Cl_7 single crystal is presented. Different Ce-doped (0, 0.5, 1 and 5 mol %) single crystals of TlGd_2Cl_7 are grown by vertical Bridgman technique. All doped samples show typical Ce^{3+} emission under X-ray excitation between 350 nm and 500 nm. The emission peak positions slightly changed with the increase of Ce-concentration in the host matrix. Excellent light yield and good energy resolution is obtained under γ -ray excitation at room temperature. Three exponential decay components are obtained for all Ce-doped samples at room temperature. Decay components changes with Ce-concentrations i.e. get faster with higher Ce-concentration. Effective Z-number is found to be 66 and therefore X- and γ -ray detection will be detected efficiently with this scintillator [1, 2]. High light yield, high Z-number with moderate energy resolution and fast scintillation response suggest that this scintillator could be used in the medical imaging techniques. Further investigations are under way for the improvement of its scintillation properties with higher Ce-concentrations.

[1] C. M. Pepin, P. Berard, A. -L. Perrot, C. Pepin, D. Houde, R. Lecomte, C. L. Melcher, H. Dautet, IEEE Trans. Nucl. Sci. 51 (2004) 789.

[2] Gul Rooh, H. J. Kim, Jonghun Jang, Sunghwan Kim, J. Lumin., 187 (2017) 347–351.

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