

The TiO₂ Refraction Film for CsI Scintillator

Authors : C. C. Chen, C. W. Hun, C. J. Wang, C. Y. Chen, J. S. Lin, K. J. Huang

Abstract : Cesium iodide (CsI) melt was injected into anodic aluminum oxide (AAO) template and was solidified to CsI column. The controllable AAO channel size (10~500 nm) can makes CsI column size from 10 to 500 nm in diameter. In order to have a shorter light irradiate from each single CsI column top to bottom the AAO template was coated a TiO₂ nano-film. The TiO₂ film acts a refraction film and makes X-ray has a shorter irradiation path in the CsI crystal making a stronger the photo-electron signal. When the incidence light irradiate from air (R=1.0) to CsI's first surface (R=1.84) the first refraction happen, the first refraction continue into TiO₂ film (R=2.88) and produces the low angle of the second refraction. Then the second refraction continue into AAO wall (R=1.78) and produces the third refraction after refractions between CsI and AAO wall (R=1.78) produce the fourth refraction. The incidence light after through CsI and TiO₂ film refractions arrive to the CsI second surface. Therefore, the TiO₂ film can has shorter refraction path of incidence light and increase the photo-electron conversion efficiency.

Keywords : cesium iodide, anodic aluminum oxide (AAO), TiO₂, refraction, X-ray

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