

IMAGING PROPERTIES OF GdAlO₃:Ce (GAP:Ce) POWDER SCINTILLATOR

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Abstract. *The aim of this study was to evaluate the performance of GdAlO₃:Ce powder scintillator screens for use in medical imaging applications. This powder phosphor, also known as GAP:Ce scintillator, is a non-hygroscopic material, emitting blue light with short decay time and it has never been used in medical imaging. Various scintillator screens with coating thickness, ranging from 14.7 to 121.1 mg/cm², were prepared in our laboratory from GdAlO₃:Ce powder (Phosphor Technology, Ltd) by sedimentation on silica substrates. Quantum Detection Efficiency (QDE) and Energy Absorption Efficiency (EAE) were evaluated. Absolute luminescence efficiency measurements were performed under exposure conditions employed in diagnostic radiology (50-140 kV, 63 mAs), using an experimental setup based on a photomultiplier tube. The emission spectrum of GAP:Ce, after calculating the matching factor, was found compatible with various existing optical detectors. QDE and EAE of GAP, comparing to YAP has exhibited higher values. Absolute Efficiency values were found to increase with increasing X-ray tube voltage. Although for values higher than 120 kV a decrease was observed.*

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