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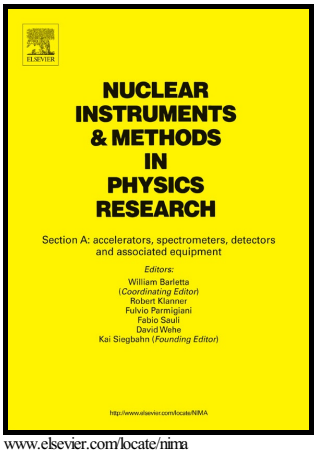

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Preparation and optimization of $CdWO_4$-polymer composite film as an alpha particle counter

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Abstract

In this research work, $CdWO_4$/ polymer composite films with different thicknesses were prepared using Poly-methyl acrylate polymer and synthesized $CdWO_4$ powder. The $CdWO_4$ powder was synthesized by a simple co-precipitation method in the laboratory. X-ray diffraction, photoluminescence, Fourier transformed infrared spectroscopy and energy-dispersive X-ray spectroscopy proved that the $CdWO_4$ powder was successfully prepared. Moreover, photoluminescence analysis showed that adding polymer does not change the emission peak of $CdWO_4$. Also, the responses of all samples were measured using an ^{241}Am alpha source with 1860 Bq activity. Results showed that the sample having thickness of 177 mg/cm^2 has the best counting efficiency (over 2π geometry) among the others. The efficiency measurement was further evaluated using a ^{230}Th source whose activity is 190.7 Bq. It revealed that the counting efficiency of this sample for both ^{241}Am and ^{230}Th was nearly equal.

Keywords: $CdWO_4$, co – precipitation, composite film, Alpha particle counting

1. Introduction

Tungstate based materials have divergent applications in different fields such as photoluminescence, humidity sensors, optical fiber, microwave applications, scintillator material, and catalysis [1,2]. Among tungstate based materials, $CdWO_4$ has special and in some way unique characteristics, which makes it one