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## Investigation of LaBr3:Ce probe for gamma-ray spectroscopy and dosimetry

By: [Maghraby, AM](#) (Maghraby, Ahmed M.)<sup>[1,2]</sup>; [Alzimami, KS](#) (Alzimami, K. S.)<sup>[3]</sup>; [Alkhorayef, MA](#) (Alkhorayef, M. A.)<sup>[3]</sup>; [Alsafi, KG](#) (Alsafi, K. G.)<sup>[4]</sup>; [Ma, A](#) (Ma, A.)<sup>[5]</sup>; [Alfuraih, AA](#) (Alfuraih, A. A.)<sup>[3]</sup>; [Alghamdi, AA](#) (Alghamdi, A. A.)<sup>[5]</sup>; [Spyrou, NM](#) (Spyrou, N. M.)<sup>[6]</sup>

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### Abstract

The main thrust of this work is the investigation of performance of relatively new commercial LaBr3:Ce probe (Inspector 1000 (TM) with LaBr3:Ce crystal) for gamma-ray spectroscopy and dosimetry measurements in comparison to LaCl3:Ce and NaI:Tl scintillators. The crystals were irradiated by a wide range of energies (Co-57, Na-22, F-18, Cs-137 and Co-60). The study involved recording of detected spectra and measurement of energy resolution, photopeak efficiency, internal radioactivity measurements as well as dose rate. The Monte Carlo package, Geant4 Application for Tomographic Emission (GATE) was used to validate the experiments. Overall results showed very good agreement between the measurements and the simulations. The LaBr3:Ce crystal has excellent energy resolution, energy resolutions of (3.37 +/- 0.05)% and (2.98 +/- 0.07)% for a Cs-137 662 key and a Co-60 1332 key gamma-ray point sources respectively, were recorded. The disadvantage of the lanthanum halide scintillators is their internal radioactivity. Inspector 1000 (TM) with LaBr3:Ce scintillator has shown an accurate and quick dose measurements at Positron Emission Tomography (PET) Units which allows accurate assessment of the radiation dose received by staff members compared to the use of electronic personal dosimeters (EPD). (C) 2013 Elsevier Ltd. All rights reserved.

### Keywords

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### Author Information

**Reprint Address:** Maghraby, AM (reprint author)

+ Salman Bin Abdulaziz Univ, Fac Sci & Humanities, Dept Phys, Alkharj, Saudi Arabia.

#### Addresses:

- + [ 1 ] Natl Inst Stand, Radiat Dosimetry Dept, Giza, Egypt
- + [ 2 ] Salman Bin Abdulaziz Univ, Fac Sci & Humanities, Dept Phys, Alkharj, Saudi Arabia
- + [ 3 ] King Saud Univ, Dept Radiol Sci, Riyadh 11433, Saudi Arabia
- + [ 4 ] King Abdulaziz Univ, Dept Phys, Jeddah 21589, Saudi Arabia
- + [ 5 ] Univ Dammam, Dept Radiol Sci, Dammam 31441, Saudi Arabia
- + [ 6 ] Univ Surrey, Dept Phys, Guildford GU2 7XH, Surrey, England

**E-mail Addresses:** [maghrabism@yahoo.com](mailto:maghrabism@yahoo.com)

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