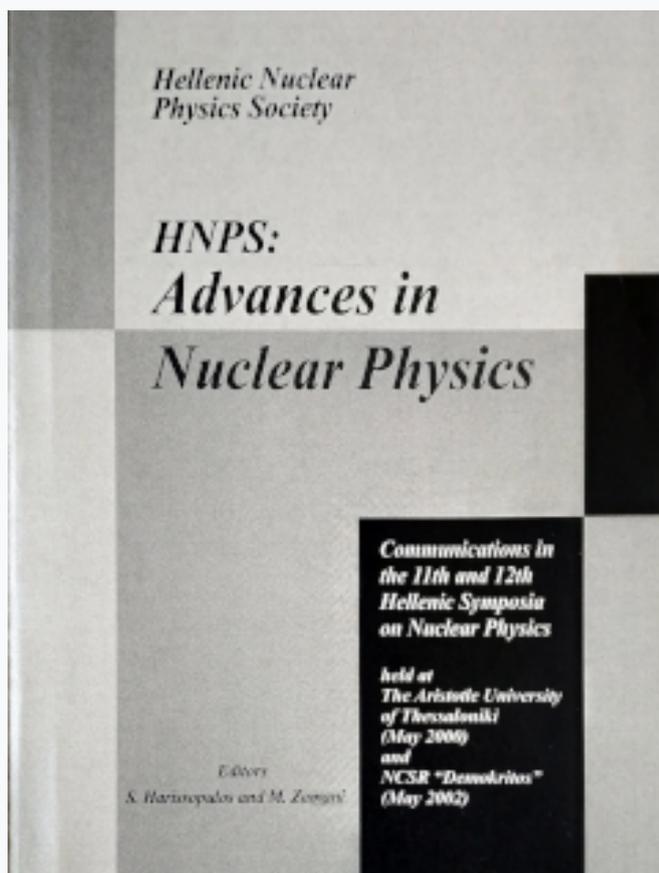


## HNPS Advances in Nuclear Physics

Vol 11 (2002)

HNPS2000 and HNPS2002



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doi: [10.12681/hnps.2234](https://doi.org/10.12681/hnps.2234)

#### To cite this article:

Karydas, A. G., Zarkadas, C., Kyriakis, A., Pantazis, J., Huber, A., Redus, R., Potiriadis, C., & Paradellis, T. (2019). X-Ray spectrometric studies using thin silicon crystals. Advantages and applications. *HNPS Advances in Nuclear Physics*, 11. <https://doi.org/10.12681/hnps.2234>

# X-Ray spectrometric studies using thin silicon crystals. Advantages and applications

A.G. Karydas<sup>a</sup>, Ch. Zarkadas<sup>a</sup>, A. Kyriakis<sup>a</sup>, J. Pantazis<sup>b</sup>, A. Huber<sup>b</sup>, R.Redus<sup>b</sup>  
C. Potiriadis<sup>c</sup> and T. Paradellis<sup>a</sup>

<sup>a</sup> *Laboratory for Material Analysis, Institute of Nuclear Physics,  
NCSR "Demokritos", Aghia Paraskevi, 153 10 Athens, Greece*

<sup>b</sup> *Amptek, Inc., 6 De Angelo Drive, Bedford, Mass. 01730 U.S.A.*

<sup>c</sup> *Greek Atomic Energy Commission, Aghia Paraskevi, 153 10 Athens, Greece*

## Abstract

This paper presents the peak-to-background ratio improvement, which can be achieved in PIXE and XRF applications by the use of thin crystal detectors. This improvement becomes apparent in the presence of an intense  $\gamma$ -ray source, which can be produced either after proton irradiation of a sample (PIXE), or after the deexcitation of the radionuclide in Radioisotope induced XRF analysis (RIXRF). In order to study theoretically the energy response of a silicon crystal in the X-ray energy region with respect to its thickness and the energy of the incident  $\gamma$ -radiation, a Monte-Carlo simulation was performed. Experimentally, two detectors having crystal thickness of 300  $\mu\text{m}$  and 3 mm respectively were employed in specific analytical applications of PIXE, PIXE induced XRF and RIXRF techniques. The peak-to-background ratios obtained for various characteristic X-rays were compared between the two detectors. The performance of the two detectors was also compared in monochromatic XRF analysis of samples with low average atomic number matrix content.