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Introduction

This volume includes the proceedings of the SPIE conference on Hard X-Ray, Gamma-Ray and Neutron Detector Physics XXI (OP319). The conference was held 12-14 August 2019 in San Diego, California (United States). The conference was organized into multiple technical sessions on semiconductor detectors, scintillator detectors, and applications and also included a poster session.

The purpose of the conference was to provide a forum for scientists and engineers from the detector development and user communities to present and evaluate the most recent results on x-ray, gamma-ray, and neutron detectors and to discuss the requirements for a variety of radiation-sensing and imaging applications. The primary theme of the conference was development of improved semiconductor and scintillator radiation detectors and imaging arrays which combine the advantages of room-temperature operation with the ability to spectrally resolve the energies of emitted x- and gamma-rays, and on applications of the technology. By eliminating the cryogen, new radiation-sensing instruments, such as spectrometers, gamma cameras, and radiographic systems, can be manufactured that are portable, lightweight, easy to operate, and relatively maintenance-free. Recent research and development on detectors has resulted in measurable progress in the availability of single detectors and imaging arrays. In addition, recent reports of the properties limiting the performance of semiconductor and scintillator detectors have provided new insights and directions to address deficiencies in the crystals and devices.

Despite the limitations on efficiency and cost of current room-temperature semiconductor and scintillator detectors, they have been increasingly deployed in systems useful for medical diagnostics, space applications, science applications, safeguarding of nuclear materials, material identification, baggage scanning, position sensing, computed tomography, and gamma-ray spectroscopy. Although significant progress has occurred over recent years, there is still a pressing need to lower the cost of the detectors and to increase the efficiency of the detectors while improving their spectral performance.

The technical program featured 56 presentations, including 14 posters. This volume provides detailed documentation describing a significant portion of the presentations. The editors hope that it will serve as an important record of the meeting, provide an update on the status of x-ray, gamma-ray, and neutron detector technology, and serve as a useful resource for those working in the field.

The conference chairs would like to thank the session chairs and members of the Conference Program Committee, who offered their time to enlist the involvement of many researchers working in the field. We also express our indebtedness to all authors who contributed to the proceedings, and to the SPIE staff for their excellent

cooperation and continuous support during the conference call, organization, and proceedings processes.

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