

PROCEEDINGS OF SPIE

Hard X-Ray, Gamma-Ray, and Neutron Detector Physics XXII

Arnold Burger
Stephen A. Payne
Michael Fiederle
Editors

24 August – 4 September 2020
Online Only, United States

Sponsored and Published by
SPIE

Volume 11494

Proceedings of SPIE 0277-786X, V. 11494

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:

Author(s), "Title of Paper," in *Hard X-Ray, Gamma-Ray, and Neutron Detector Physics XXII*, edited by Arnold Burger, Stephen A. Payne, Michael Fiederle, Proceedings of SPIE Vol. 11494 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510637948

ISBN: 9781510637955 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA

Telephone +1 360 676 3290 (Pacific Time) Fax +1 360 647 1445

SPIE.org

Copyright © 2020, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$21.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/20/\$21.00.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.

SPIE. DIGITAL LIBRARY

SPIDigitalLibrary.org

Paper Numbering: *Proceedings of SPIE* follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

Contents

SCINTILLATOR DETECTORS I

11494 05 **Ultra-short nuclear lifetimes measured with fast detectors and faster electronics** [11494-4]

KELVIN LYNN AND BOB MCLAREN DEDICATED SESSION

11494 09 **Development of Tl-based novel scintillators (Invited Paper)** [11494-8]

APPLICATIONS

11494 0B **Modern trends in gamma detection systems for emergency response** [11494-10]

11494 0C **3D stacked sensor and detector using less than 5 μ m-pitch micro-bump connection** [11494-11]

11494 0D **Newer aerial platform for emergency response by the United States Department of Energy** [11494-12]

MULTIMODAL IMAGING I

11494 0N **Scintillators and detectors for MeV x-ray and neutron imaging (Invited Paper)** [11494-22]

11494 0P **NIST NeXT: a system for truly simultaneous neutron and x-ray tomography (Invited Paper)** [11494-24]

11494 0Q **Fast neutron spectroscopy from 1 MeV up to 15 MeV with Mimac-FastN: a mobile and directional fast neutron spectrometer** [11494-25]

11494 0R **Development of gamma ray detector pixels for neutron-diagnosed subcritical experiments (LA-UR-20-25620)** [11494-50]

MULTIMODAL IMAGING II

11494 0S **Developing a dual energy x-ray absorptiometry (DEXA) system using SrI₂:Eu²⁺ coupled to silicon photomultiplier (SiPM) (Invited Paper)** [11494-26]

11494 0T **Characterization of a reactor-based fast neutron beam facility for fast neutron imaging (Invited Paper)** [11494-27]

11494 0V **The single-volume scatter camera (Invited Paper)** [11494-29]

SEMICONDUCTORS AND APPLICATIONS

11494 0X **Thick 4H-SiC epitaxial detectors for high-resolution radiation detection in harsh environment (Invited Paper)** [11494-31]

SCINTILLATOR DETECTORS III

11494 13 **Polysiloxane scintillators for neutron and gamma-ray pulse shape discrimination** [11494-37]

11494 14 **Developments in garnet-based scintillating composites for radiation detection applications** [11494-38]

11494 15 **Scintillators from solution-processable perovskite halide single crystals or quantum dots: the good, the bad, and the ugly** [11494-39]

11494 16 **Evaluation of a novel bismuth-loaded plastic array for x-ray and neutron radiography** [11494-40]

POSTER SESSION

11494 17 **Geant4 and MCNP6.2 modeling of fast-neutron detectors based on single-crystal chemical vapor deposition diamond** [11494-41]

11494 18 **The effect of laser treatment on the morphology of graphene/CdTe x-ray and γ -ray detectors** [11494-42]

11494 19 **Effect of the concentration of impurities: determining the space charge region thickness on detection properties of Cr/CdTe/Au Schottky diode detectors** [11494-43]

11494 1D **Proposal for a SiPM-based cosmic ray detector for use on suborbital and orbital flights** [11494-47]

11494 1F **Investigation on $\text{Cd}_{0.9}\text{Zn}_{0.1}\text{Te}_{1-y}\text{Se}_y$ single crystals grown by vertical Bridgman technique for high-energy gamma radiation detectors** [11494-49]