Special Issue on Room-temperature-operation Solid-state Radiation Detector

Preface

It is with great pleasure that we introduce this Special Issue dedicated to advancements and explorations in the realm of solid-state radiation detectors, particularly those operational at room temperature. The field of radiation encompasses a vast spectrum of topics, including but not limited to X-rays, neutron beams, particle beams, and electron beams. The principles underpinning their detection are multifaceted but primarily rooted in semiconductor physics and phosphor chemistry. Yet, the very high energy levels associated with radiation often stretch beyond the capabilities of conventional semiconductor technology or phosphor chemistry.

This issue shines a spotlight on solid-state radiation detectors, emphasizing their utility in prevalent applications such as transmission imaging and diagnostics while functioning optimally at ambient temperatures. The compendium of research presented herein is a testament to the collective endeavor of numerous scholars, particularly those affiliated with the Research Group on Compound Semiconductor Detectors Operating at Room Temperature. This consortium, operating synergistically with established academic societies, has been pivotal in nurturing this niche yet burgeoning field through rigorous research and open exchange of information.

In curating this issue, we have endeavored to encapsulate a diverse array of contributions. These encompass papers grounded in cutting-edge science and technology, alongside valuable research that, until now, has remained unpublished due to various constraints. Moreover, this issue includes papers that, owing to their innovative approach and complex subject matter, posed significant challenges in the peer-review process. It is imperative to acknowledge that the domain of radiation detectors is not only expansive but also replete with specialized knowledge in fabrication and evaluation methodologies—knowledge that is often underrepresented in conventional journals. By zeroing in on this specialized field, this issue serves as a repository of shared expertise, potentially catalyzing further advancements in the sector.

While the focal point of this issue is solid-state radiation detectors operational at ambient temperature, the breadth of research it encompasses is formidable. We are proud to present 14 insightful papers that delve into semiconductor detectors and their pivotal role in radiation measurement. The materials featured in these studies are as varied as the applications they cater to, with submissions including six papers on TlBr, four on CdTe, two on diamond, one on GaN, and a noteworthy paper on computer tomography utilizing CdTe. The methodologies employed in these studies are equally diverse, heralding a promising era of interdisciplinary collaboration. It is our firm belief that such collaboration will not only refine existing radiation detectors but also pave the way for innovative measurement and imaging devices, all underpinned by novel principles.

The genesis of many studies featured in this issue can be traced back to the Cooperative Research Project of the Research Center for Biomedical Engineering and Research Institute of Electronics, Shizuoka University. As guest editors of this special issue, we extend our heartfelt gratitude to all contributors and collaborators for their invaluable input.

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