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Editorial

Editorial for the Special Issue on "Crystalline Materials for Radiation Detection: A New Perspective"

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The development of efficient and environmentally friendly technologies for radiation detection is a great challenge. Among the materials of present and future perspective are crystalline materials, wide-bandgap semiconductor crystals. The recent progress in crystal growth, theoretical modelling, understanding of radiation-induced defects, and radiation hardness has offered a new perspective for radiation detection. In this Special Issue of *Crystals*, we have gathered five peer-reviewed papers that shed light on recent advances in the field of application of SiC for radiation detection and beyond.

Brodar et al. [1] report on neutron irradiation and ion (2 MeV He and 7.5 C MeV) implantation-induced electrically active defects in nitrogen-doped 4H-SiC material. Radiation-induced defects and their respective deep levels were comprehensively studied by means of deep level transient spectroscopy. Potsidi et al. [2] also investigated radiation-induced defects but used another approach. They combined experimental (infrared spectroscopy, IR) and theoretical (spin-polarized density functional theory calculations) tools to study the carbon interstitial-dioxygen center of electron-irradiated Si. Focusing on radiative recombination in the nanosystem, Pokutnyui et al. [3] report on possibilities for a new generation of efficient light-emitting photodetectors based on semiconductor heterostructures. Coutinho [4] reports a theoretical study of the electronic and dynamic properties of silicon vacancies and self-interstitials in 4H-SiC using hybrid density functional methods. This work consolidates some of the most recent findings and revisits some unsolved issues by analyzing the charge-state dependence of transformation, dissociation, and migration of Si-related intrinsic defects in 4H-SiC. Finally, Bernat et al. [5] report the response of newly designed 4H-SiC Schottky barrier diode (SBD) detector prototypes to alpha and gamma radiation. A detector resolution of 3% for the wide alpha energy range, combined with the linear response to gamma, yields rates of up to 4.49 Gy/h, demonstrating the usability of this system for the detection of thermal neutrons and gamma decays.

As shown in this Special Issue of *Crystals*, the study of crystalline materials continues to grow and expand as we, as a community, strive to acquire further understanding of the underlying potential of these materials. The goal is to bring these and other new concepts closer to application for radiation detection and beyond.

Conflicts of Interest: The authors declare no conflict of interest.

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