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Light Extraction Enhancement in Inorganic Scintillators for Total-body PET Scanners using Photonic Crystals

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Scintillators play an important role in the detection of ionizing radiation. Improving extraction and detection of the generated light is a must to provide sufficient information on the high-energy particles interacting with the crystal. The amount of light extracted and its temporal distribution have a direct impact on the overall system performance. In positron emission tomography, energy resolution and coincidence resolving time are two of the main parameters that depend on the amount of detected light. In this study, we combine and compare several light extraction techniques for two common inorganic scintillators. An approach using a novel photonic crystal structure is also introduced. A maximum gain of ~41% on light extraction and ~21% on energy resolution was observed on BGO crystals using the proposed solution.

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