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Radiation-induced photoluminescent point defects in lithium fluoride for versatile X-ray imaging detectors

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Microscopy imaging detectors play a crucial role in the field of X-ray technologies. The research and development of new advanced detectors is fundamental in order to overcome some of the limits of the standard ones. Solid-state X-ray imaging detectors based on visible photoluminescence from aggregated electronic defects, known as colour centres (CCs), locally produced in lithium fluoride (LiF) crystals and thin films will be discussed. Their peculiar features, such as a very high spatial resolution over a large field of view, wide dynamic range, versatility and simplicity of use combined with the sensitivity of the optical fluorescence reading technique, make LiF-based detectors very attractive for several X-ray imaging applications. In this work, we show the results of X-ray imaging experiments performed by using LiF detectors for (a) a laboratory X-ray source combined with polycapillary optics in contact mode configuration and (b) a synchrotron facility in diffraction-mode configuration. The achieved results confirm that LiF-based detectors are powerful and versatile tools for X-ray imaging.

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