Contribution ID: **14** Type: **not specified**

”Volumetric reconstruction of color center distributions in X-ray irradiated LiF crystals obtained by confocal spectro-microscopy techniques” (remotely)

Wednesday, June 22, 2022 3:20 PM (20 minutes)

Volumetric reconstruction of color center distributions in X-ray irradiated LiF crystals obtained by confocal spectro-microscopy techniques. F. Bonfigli1, S. Botti1, R.M. Montereali1, E. Nichelatti2, V. Nigro1, M. Piccinini1, M.A.Vincenti1, A. Cecilia3 1 ENEA C.R. Frascati, Fusion and Technologies for Nuclear Safety and Security Dep., Photonics Micro- and Nano-structures Laboratory, FSN-TECFIS-MNF,V. E. Fermi, 45, 00044 Frascati (Rome), Italy 2 ENEA C.R.Casaccia, Fusion and Technologies for Safety and Security Department, Photonics Micro-and Nano-structures Laboratory, FSN-TECFIS-MNF, V. Anguillarese 301, 00123 S.Maria di Galeria, Rome, Italy 3 Institute for Photon Science and Synchrotron Radiation, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany Lithium fluoride (LiF)-based detectors represent a versatile tool for X-ray imaging and for characterization of X-ray beams and optics. These detectors have been used with several X-ray sources, such as compact sources [1, 2, 3], large-scale facilities [4] and for X-FEL beam monitoring [5, 6]. Among the peculiarities of LiF-based detectors, noteworthy ones are their very high intrinsic spatial resolution across a large field of view, wide dynamic range and versatility. LiF detectors are based on radiation-induced color centers (CCs) locally produced by X-rays. The penetration depth of X-rays produces CC volumetric distributions in LiF crystals. We report 3D reconstructions of X-ray-induced CC volumetric distributions in LiF crystals performed by confocal spectro-microscopy techniques: fluorescence microscopy and Raman micro-spectroscopy. The investigated LiF crystals were irradiated with monochromatic X-rays (8 e 16 keV) at KIT synchrotron light source (Karlsruhe, Germany) and with the broadband white beam spectrum of the synchrotron bending magnet.The combination of capability of a LiF crystal to register volumetric X-ray mapping with the optical sectioning operations of the confocal techniques has allowed to obtain 3D reconstructions of the X-ray colored volumes [7], providing promising results for 3D X-ray detection advanced tools. [1] D. Hampai et al, NIMA 720, 113-115, (2013). [2] S. Almaviva et al, Appl. Phys. Lett. 89, 054102-1-3, (2006). [3] G. Baldacchini et al, Review Scientific Instrument 76 (1), 113104-1-12, (2005). [4] F. Bonfigli et al, Radiation Measurements 56, 277-280, (2013). [5] F. Bonfigli et al, Il Nuovo Cimento 42 C 237, 1-8, (2019). [6] F. Bonfigli et al, Proc. of SPIE Vol. 11035, Optics Damage and Materials Processing by EUV/X-ray Radiation VII, edited by Libor Juha, Saša Bajt, Stéphane Guizard 110350N-1,11 (2019). [7] F. Bonfigli et al, Condens. Matter 6, 37, (2021).

Presenter: Dr BONFIGLI, F. (ENEA Frascati)