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Lithium Fluoride film detectors for hard x-ray contact microscopy at high spatial resolution

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-ray microscopy and tomography is a field in rapid expansion, due to strong improvements in x-ray sources, optics and detectors. For high spatial resolution (of the order of few hundreds nanometers and below) in the hard x-ray region, highly demanding optical elements are in general required. For use with laboratory sources, conditions are obviously more stringent due to low flux. In this contribution we will present a simple, relatively inexpensive method which allows collecting high spatial resolution (about 250 nm) images with a laboratory microsource using Lithium Fluoride (LiF) films as imaging detectors in contact mode. LiF has a crystalline f.c.c. structure and, under exposure to ionizing radiation, can host different types of Color Centers (CC), electronic point defects in the lattice matrix [1]. Some of them (in particular the F_2 and F^+_3 CCs' which are aggregates of the primary F centers), are optically active, with broad absorption and emission bands in the visible spectral range [2,3] and stable at room temperature. The CCs' are extremely localized (around 1 nm), and are therefore well suited to record x-ray images with high spatial resolution. After exposure to x-rays, the images stored in LiF films were read with a confocal optical microscope. We present in this contribution examples of images which demonstrate a resolution of the order of 250 nm, a limit essentially dictated by the optical resolution of the reading instrument. Clear advantages of the LiF detector are the intrinsic high spatial resolution (far beyond the limit shown here), the wide dynamic range, the large field of view, the easiness of use, as it is insensitive to visible light and it doesn't need any development after exposure, and finally the relatively low cost. Discussion about its potentialities in x-ray microscopy will be discussed

[1] W. B. Fowler, *Physics of Color Centers*, W. B. Fowler ed., Academic Press, New York and London, 1968.
[2] R. M. Montereali, in Handbook of Thin Film Materials, H. S. Nalwa ed., Vol.3 Academic Press, Ch.7, p. 399 (2002).
[3] J. Nahum and D. A. Wiegand, *Phys. Rev.* 154, 817 (1967).

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Molecular Recognition of Carbohydrates with Artificial Receptors

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Artificial carbohydrate receptors provide valuable model systems to study the basic molecular features of carbohydrate recognition. On the other hand, the binding motifs observed in the available crystal structures of protein-carbohydrate complexes inspire the development of artificial receptor molecules. Understanding how carbohydrates interact with their protein receptors is of particular importance due to the key roles which sugar molecules play in a variety of biological processes. Advances in this area provide useful information for the design of both protein and carbohydrate mimetics, which may serve as a basis for the development of new therapeutic agents or chemosensors. Our interest in this area concentrates on receptors which possess a simple, acyclic structure and which are expected to complex carbohydrates through multiple interactions. The systematic studies toward recognition motifs for carbohydrates showed that amino-pyridines, -pyrimidines and -naphthyridines provide an excellent structural motif for binding carbohydrates, associated with the ability to form cooperative and bidentate hydrogen bonds with the sugar OH groups. Noteworthy, the crystal structures of the complexes formed between the acyclic receptors and monosaccharides have proved to contain many of the molecular features associated with protein-carbohydrate interactions. In these complexes all OH groups and the ring oxygen atom of the bound sugar are involved in the formation of hydrogen bonds, whereas the CHs of the sugar molecule participate in the formation of the CH•••π interactions with the central phenyl ring of the receptor. The binding modes between the acyclic receptors and carbohydrates will be discussed in detail on the basis of molecular modeling calculations, chemical shift changes in ^{1}H NMR spectra and X-ray analyses.

[1] Mazik, M.; Kuschel, M.; Sicking, W. *Org. Lett.* 2006, *8*, 855-858.
[2] Mazik, M.; Cavga, H.; Jones, P. G. *J. Am. Chem. Soc.,* 2005, *127*, 9045-9052.
[3] Mazik, M; Radunz, W.; Boese, R. *J. Org. Chem.* 2004, *69*, 7448-7462.
[4] Mazik, M; Sicking, W. *Tetrahedron Lett.* 2004, *45*, 3117-3121.
[5] Mazik, M; Bandmann, H.; Sicking, W. *Angew. Chem. Int. Ed.* 2000, *39*, 551-554.
[6] Mazik, M.; Sicking, W. *Chem. Eur. J.* 2001, *7*, 664-670.
[7] Mazik, M.; Radunz, W.; Sicking, W. *Org. Lett.* 2002, *4*, 4579-4582.