Abstract Submitted
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Design, nanofabrication and testing of silicon and diamond hard X-ray optics[1] A.F. ISAKOVIC, NSLS-Brookhaven National Laboratory, A. STEIN, J.B. WARREN, K. EVANS-LUTTERODT, Brookhaven National Laboratory, S. NARAYANAN, Argonne National Laboratory, M. SPRUNG, A. SANDY, Argonne National Laboratory — We have designed, fabricated and tested silicon (Si) and diamond based X-ray kinoform lenses. In design and nanofabrication of such X-ray optics elements, surface roughness and wall verticality are among the tasks of critical importance for achieving as-designed performance. Our cyclic cryogenic RIE method [1], developed to deal with such stringent nanofabrication requirements, is comparable in performance to licensed Bosch process, as established in measurements of the surface roughness, and the etch rate (>2 microns/min for Si, ∼100 nm/min for diamond) and verticality (<1deg over 100 microns) parameters. We compare nanofabrication procedures for Si and diamond lenses, and discuss relative merits of Si and diamond as materials for X-ray lenses. We also show sub-100 nm spot size tests of kinoform Si-based X-ray focusing optics, determined via knife edge measurements at APS 8-ID, and a preliminary results of tests of diamond-based kinoform lens at NSLS, performed at X13B and APS 8-ID. [1] A. F. Isakovic et al., submitted for publication.

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