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## **Design of a coherence-based beamline for x-ray microfocusing at the APS**

W. Yun, B. Lai, Z. Cai, D. Shu, and J. Barraza

*Advanced Photon Source, Argonne National Laboratory*

Development of high performance, hard x-ray focusing devices is among the most important instrumentation development programs at the Advanced Photon Source (APS). The main purpose of this program is to effectively utilize the high brilliance synchrotron x-ray beams that will be provided by the APS. The combination of a high performance focusing optic with the high brilliance x-ray beam will produce a focused x-ray beam that is many orders of magnitude more intense than what is available today. This focused intense beam can add spatial resolving power to many conventional x-ray techniques. We have developed a x-ray microscope in the last few years that has been used for spatial-resolved spectroscopy, spatial-resolved microdiffraction, and spatial-resolved fluorescence analysis. A zone plate is the main focusing device used in this microscope. In recent years, we have successfully developed hard x-ray zone plates using a combination of e-beam and x-ray lithographs in collaboration with Prof. Cerrina of the University of Wisconsin and Dr. DeFabrizio of IESS of Italy. Zone plates with spatial resolution better than 0.2 micron and focusing efficiency better than 30% have been developed. Recently, we have fabricated some blazed zone plates with expected focusing efficiencies possibly better than 70%.

Two beamlines that are dedicated for x-ray microfocusing applications have been designed and are being constructed. Starting with the spectral and beam property requirements, an optical design taking into account the thermal loading and radiation shielding was developed.

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