ESRF	**Experiment title:** Evaluation of refractive lenses with triangular surface profile	**Experiment number:** MI-566
Beamline: BM05	**Date of experiment:** from: 07/05/2002 to: 09/05/2002	**Date of report:** 18/08/2002
Shifts: 6	**Local contact(s):** Joanna Hoszowska	*Received at ESRF:*

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Report:

Abstract:
Saw-tooth refractive x-ray lenses have been used to focus a synchrotron beam to sub-μm line width. These lenses are free from spherical aberration and work in analogy with 1-D focusing parabolic compound refractive lenses. However, the focal length can be varied by a simple mechanical procedure. Silicon lenses were fabricated by wet anisotropic etching, and epoxy replicas were molded from the silicon masters. Theses lenses provided 1-D intensity gains up to a factor of 40 and the smallest focal line width was 0.74 μm, very close to the theoretical expectation. Two crossed lenses were put in series to obtain 2-D focusing and the 80 μm by 275 μm source was imaged to 1.0 μm by 5.4 μm. Beryllium lenses were fabricated using conventional computer-controlled milling. The focal line width was 1.7 μm, nearly 3 times larger than predicted by theory. This can be attributed to large surface roughness and a bent lens shape.

Reference:

B. Cederström, C. Ribbing and M. Lundqvist, “Saw-tooth refractive x-ray optics with sub-micron resolution”, Proc. SPIE **4783**, Design and Microfabrication of Novel X-Ray Optics, 2002, in press.