

Status of nanofabrication at ZonePlates.com

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Since the last X-ray microscopy conference (Grenoble 2002), we have made considerable progress in all aspects of micro and nano fabrication.

Through systematic and careful control of thin film deposition parameters, we have been able to minimize stress in zone materials, which in turn has enabled us to fabricate high-resolution nanostructures with minimum dimensions below 50 nm, and thickness of up to 1.5 μm . Tungsten is still the material of choice for the fabrication of diffractive optical elements, because it offers exceptional diffraction efficiencies throughout the most used X-ray energy range. It is also a very stable material, due to the close matching of its thermal expansion coefficient with that of Si/Si₃N₄, which are the most common substrate materials. Examples of our recent work in tungsten will be shown, both diffractive optics and Test Objects (TOs), with aspect ratios of >5 and in some cases near 10.

More recently, we have been involved with the design and fabrication of a new generation of condenser Zone Plates for Imaging microscopy, which should give a uniformly illuminated large (30-50 μm) object field, as well as minimize some unwanted diffraction effects common in modern high coherence beamline designs.