Soft X-Ray Microscopy and EUV Lithography: Imaging in the 20-50 nm Regime

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Advances in short wavelength optics, covering the range from 1 to 14 nanometers (nm), are providing new results and new opportunities. Zone plate lenses for soft x-ray microscopy are now made to high accuracy with outer zone widths of 25 nm, and demonstrated resolution of 23 nm with proper illumination and stability. These permit important advances in the study of protein specific transport and structure in the life sciences, and the study of magnetic materials with elemental sensitivity at the resolution of individual domains.

Major corporations are now preparing the path for the fabrication of future computer chips, in the years 2007 and beyond, using multilayer coated reflective optics, which achieve reflectivities of 70% in the 11-14 nm region. These coated optics are to be incorporated in EUV print cameras, known as “steppers”. Electronic patterns with features in the range of 50-70 nm have been printed. The first alpha tool stepper recently demonstrated all critical technologies needed for EUV lithography. Pre-production beta tools are targeted for delivery by leading suppliers in 2004, with high volume production tools available in late 2006 for manufacturing in 2007.

New results in these two areas will be discussed in the context of the synergy of science and technology.

References

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