

FUTURE PLANS AND RECENT ACCOMPLISHMENTS AT CNTECH

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There have been a number of new instruments added to the facilities at CNTech over this past year and a number of accomplishments in the research and development area that will be highlighted in this presentation. First, the high energy beamline providing 2,750 keV (0.45 nm) exposure radiation to the Mitsubishi Electric Company (MELCO) written diamond membrane X-ray masks has proven the concept that removing the carbon from the mask membrane and operating at higher energy will reduce the effects of diffraction and permit the printing of smaller linewidth mask features. This beamline feeds the JSAL Mod 4 stepper, and it has been upgraded to perform well at small gaps. The metrology capabilities have been upgraded with a LEO scanning microscope with 2 nm resolution and an atomic force microscope equipped with nanotube tips.

New etching equipment for CNTech has arrived and has been installed on campus in the new cleanrooms of WCAM in the Engineering Centers building. These etchers will provide the capability for etching polysilicon, a material of choice for the clear phase X-ray mask involving the Bright Peak Enhanced X-ray Phase Mask (BPEXPM). The progress of the BPEXPM effort will be described, and we note that the work has progressed to the point that modeling and experiment are in agreement. The BPEXPM has been shown to produce wafer images factors of 3-5 smaller than the mask image and considerably larger gaps than utilized with proximity X-ray lithography. CNTech is working with BAE Systems of Nashua, NH to make devices with this technology.

Negotiations are in progress with SEMATECH to install a short section undulator on the ring to power a new EUV exposure station operating at 13.4 nm. SEMATECH needs access to such a station to foster the development of EUV lithography involving multi-layer masks. Currently, CNTech operates an EUV exposure station on the U2 undulator, and recent results on that beamline will be described.

CNTech has continued its work with new chemically-amplified resists and their optimization for high resolution, high contrast, and high sensitivity operation. The Design of Experiments optimization has proven to be especially useful for this effort.

We are expecting delivery of a stepper in June of 2004 from JSAL of Burlington, VT that will push the state-of-the-art in overlay alignment. This stepper will utilize an approach that was developed at MIT called the Interferometric Broad Band Imaging (IBBI) system.

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