



malized transmission change as the gold stripe is scanned. The absolute intensity change was 2%, taken at 12.3 keV, using a multilayer monochromator, where the incident flux exiting the pipette was 10^6 photons/sec.

A two-dimensional image can be formed by monitoring absorption as the 2-dimensional pattern of the gold lines described above is scanned across the tip. Since this type of 2D raster scan requires long periods of data collection, these experiments have proven to be very stringent tests of the stability of the x-ray beam position and angle. We are excited about the possibility of doing microprobe imaging experiments on the submicron scale.

The application of these condensing and confining devices to Laue diffraction from proteins was tested in a collaboration with Steve Ealick. Using a $100\ \mu\text{m}$ thick lysozyme crystal and a $5\ \mu\text{m}$ diameter x-ray beam, very nice Laue photos were obtained in 10 second exposures. With the attribute of enhanced intensities, microbeams from single tapered glass capillaries may greatly boost our ability to determine three-dimensional protein crystal structures that are too small for the present technology.

A new addition to our group, Dan Thiel who has just finished up his Ph. D. work at Cornell, has been instrumental in the making and profiling of pipettes, while Steve

Hoffman has been heavily involved with the Laue diffraction and imaging experiments. Aaron Lewis (Hebrew U.) and Ed Stern (U. of Washington) also continue to contribute to the collaboration.

Submicron-sized x-ray beams

Don Bilderback
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Submicron diameter x-ray beams have been made using single hollow tapered capillaries. X-rays are concentrated into a smaller cross-section (becoming more divergent) by totally reflecting from the inner walls of tapered glass pipettes. The smallest beam to date had a $0.1\ \mu\text{m}$ diameter and a gain (intensity/area) of 960 at 6 keV.

Beam sizes are confirmed by scanning the edge of a $1000\ \text{\AA}$ thick gold stripe, lithographically deposited onto a silicon wafer, across the tip of the capillary. The figure above illustrates the experimental set-up, while the figure below shows the nor-

Call for MicroScience X-ray Station at CHESS

The microscience group at Cornell is interested in new applications of microbeams to science. For instance, we plan to look at fibers of a few microns in diameter in the near future with Material Scientists (David Grubb, Chris Ober, Wade Adams, etc.) using wide angle x-ray scattering to determine the local structure differences from the skin and core, for instance, of strong man-made composite fibers. We also plan to map the strain, microstructure, and composition of tiny polycrystalline crystals (Slade Carghill, Jeff Noyan) using high spatial resolution with microdiffraction and microfluorescence measurements. Many biological experiments are also in the conceptual stage.

We are also in the process of raising funding for specific equipment to outfit a CHESS beamline for these kinds of investigations. The biological work has support from MacCHESS, but we hope to generate additional support in the Material Science community. One possibility is to complete a first round of preliminary experiments of the type described above and then to approach the Division of Materials Research at the NSF to fund the creation of a specialized beamline over a 2 yr. period of time, including a person to help construct and oversee collaborative experiments (miniature monochromators, translation stages, fluorescence detectors, tiny 2-d CCD detectors, etc.). We need to raise about \$200,000 to adequately fund these efforts. Additionally, we would like to attract visiting scientists to come and join us in these efforts for some period of time. If you are interested in contributing in time, effort, or even funding for these activities, please contact Don Bilderback immediately at Ph: 607-255-0916 or Bitnet: bilderback@crlnches.

